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EDITORIAL NOTES.

The Coal Industry's Distaste for This and That.

THE coal-mining industry does not like statutory regulation; and some of its units now feel like kicking themselves for the extraordinary fondness developed by them for self-interest during the first nine months of the war, and for the fairly widespread disregard for covenants which prevailed, and which put many good customers in tight corners. Now they seem to think that the Government are not so serious over the coal-price regulating legislation as they professed to be; that what is now law has only been passed with the view of producing some moral suasion; and that, as long as the coal people are temperate, the Board of Trade will wink at little evasions. This seems to be something about the opinion of the "Iron and Coal Trades Review," and of not an inconsiderable section of coal traders. The straws at which the latter are now grasping appear to be as weakly as any that ever sprang out of the earth. It transpires that the President of the Board of Trade met a deputation of coal traders; and they took away with them an expression of view on the part of Mr. Runciman that, "provided only a moderate "profit was made, no anxiety need be felt as to the operation "of the Act." The "Review" admits that this is rather a frail reed, but administers a little salve when it says that, "while it is the avowed purpose of the Government to "punish a flagrant and unreasonable violation of the law, it "was not the intention of the Legislature that either collieries "or anyone else engaged in the trade should be forced by "Act of Parliament to do business at a loss." Then our contemporary goes on to say that the Act is intended simply to steady prices, and to prevent huge profits; and, in view of Mr. Runciman's significant hint, it is thought that, so long as the spirit of the Act is observed, the letter will not be insisted upon too harshly. Moreover, the Act itself says that a person coming within its scope shall not be subject to fine if he can show that he had reasonable grounds for believing that he was not committing an offence. The excuses that will be put forward as "reasonable grounds" will no doubt be many, various, and amusing. However, in these ways the speakers and writers for the coal industry are trying to spread some comfort by saying that the Act is not exactly what it seems, that it is elastic, and that it is not so severely disciplinarian as was at first supposed. It would never do for Parliament to allow the idea to prevail that any of their enactments are not serious and effective instruments. If the Act gave the coal people scope for deliberately evading its provisions, it is clear from the coal history of the past few months that Parliament would soon have to pass an amending measure.

There is confidence, too, that the operations of the Coal Exports Regulation Committee do not meet with the entire approval of the coal industry. The Committee, at the beginning of their work, had a rare tussle with those who desired to secure licences for shipments without full inquiry, and who piteously pleaded delay and loss. Had the Committee not been firm, the result would only have meant confusion of the working of the newly-instituted machinery. The Committee gained the day; and so benefited the coal reserves in the country in remarkably quick time. But there are still ambiguous references to the manner in which the work of the Committee is being carried on. It would almost seem that the coal interests are hinting at a want of "discretion" on the part of the Committee. With liberty curtailed, it is perhaps natural there should be a little snarling. But it would be distinctly more diplomatic to make the best of the situation, and endeavour to loyally help the Government appointed machinery to effect the purposes in view. The "Iron and Coal Trades Review" tells its readers that the position of collieries in exporting centres is complicated by the licence regulations, which, unless they are worked with much "discretion," seem likely to defeat one of the objects the Government have in view—by causing stoppages at pits mainly dependent upon the shipping trade, and so reducing output instead of increasing it. If this is not an oblique suggestion that discretion has not been altogether a feature of the working of the export regulations, then we are dense in interpreting the meaning of words.

As to collieries stopping production, there need be no fear of them doing this on the ground of absence of a market for the output. Really, the most singular and illogical arguments are bred and distributed in the coal industry. One day an effort is made to ram the violated "law" of supply and demand down one's throat—the supply, it is pointed out, is curtailed (which is true) because of the absence of miners; hence the higher prices charged at home. This is one argument. Then when exports are regulated, it is said that some collieries will have to shut down, although, before the advent of export restrictions, the country was crying out for coal, and asking that steps should be taken to fill the void—the while the coalowners and traders were pushing up prices to a degree that threatened industry, and caused householders (the poor especially) to hesitate to purchase, and to use coal sparingly. Truly there does not appear to be any sequence in the arguments of the coal interests. Let them reflect. Before the coal export regulating machinery was put into motion, the "law" of supply and demand came into play in this country, because there was an insufficiency of coal output. Therefore, there was here a good margin of absorptive power for coal, combined with which provision has to be made for giving France a supply double that demanded before the war. The case for collieries closing-down does not seem to be a very strong one. It is really a case for trying to get the authorities to increase the exports, which would mean a repetition of the pinch at home, and the maintenance of maximum possible prices, with higher profits on the exported coal.

Talking of exports, a strange story is told as to the control of the coal exported to Holland. The "Iron and Coal Trades "Review" is the authority. It was well known that the Dutch Government at the beginning of the war created a Coal Control Committee, called the Kolenbureau in Utrecht, with the view to the prevention of all speculation in coal. The composition of this Committee, and its location in the premises of the Dutch branch of the German Coal Syndicate, indicate the nationality of the control that is placed upon coal entry in Holland. Any coal not consigned in the first place to the Kolenbureau is seized by the Dutch Government, and put at the disposal of the Kolenbureau. The "Review" points out that the result of this is that the German Coal Syndicate have in their hands the disposal of any coal imported into Holland; and in this way they are in the position to deliver to their regular customers British coal at the expense of those merchants who prefer a separate commercial existence rather than be at the beck and call of the Westphalian Coal Syndicate. "The prac-"tical effect of this is that the German Coal Syndicate, "who are the only competitor of British coal in the Dutch "market in ordinary times, are now using British coal for "their special customers, leaving others simply in the "cold." The Teutonic idea of freedom is the concentration of control—from the smallest to the greatest of the world's affairs—in German hands. How the Dutch Government came in this way to put the coal supply of their country under the power of the German Syndicate is a matter we are not going to attempt to try to fathom.

The only other two coal questions that have prominently engaged attention during the past week are the proposed suspension of the Eight Hours Act, and the attempted settlement of the lines of the new agreement between the South Wales coal miners and owners, under the arrangement, entered into recently, which secured the return of the men to work. This is a matter that requires much delicate handling. The same with the suggested suspension of the

Eight Hours Act. Regarding this, there is great variation of opinion in different coal-mining districts; and in some it is feared that any disturbance of existing conditions through the suspension of the Act would have the contrary effect to that intended—the increase of the coal output. If (we get tired of writing "if" in this connection) the miners would only put their backs into the work and give full time to it, instead of the absentees on some days of the week amounting to 20 and 30 per cent., there would be no occasion to suspend the Act in order to get all the coal required. This could be done if the men only made up their minds to do it. It is only fair to say that there are districts in which the miners have shown that they are fully alive to the needs of the country; and the Board of Trade labour statistics also indicate that there is better time-keeping now than formerly in some of the areas. If the remainder of the men could be won over to see that their part in the war is coal-getting, and to the extent needed, it would be better than causing irritation by the suspension of the Act, though we cannot see that suspension, with complete re-establishment at the end of the war, would be in any wise to the men's detriment. However, there is obviously one way that is better than the other in the circumstances; and nothing should be left undone to secure the utmost effect from it. Good effect has already resulted from direct appeals to the miners, who are not all eligible, as some people (with interests to serve) would have us believe, for inclusion in a class of recalcitrants and addled heads altogether beyond hope. This question of the suspension of the Act is also one on which more will be heard. The Coal Organization Committee have been discussing the matter; and they have now convened a conference of those primarily concerned in it.

The Foolishness of Interrupting Business in Gas-Heating Appliances.

Some time ago the coal merchants of London made an attack upon the use of gas as a fuel in the vain attempt to stop its progress—a progress that they found was inconveniently eating into their household coal business. Their efforts bore no fruit, any more than did the command of dear old Canute to the waves to cease their rolling. The waves paid no heed to the regal voice; and the public have paid no heed to the voice of the coal merchants. Gas fire and cooker connections continue to be made; and now the coal merchants, or rather the less reputable of them, have done a good turn to gas undertakings by opening their mouths a little too widely during the war. While high prices ruled last winter for household coal, gas-fires and other gas-heating apparatus were in some districts going in as freely as ever; and, in the case of one company of which we have information, the number of heating appliances fixed during the past half year about equalled the record for a June six months, and this without any special effort. Speaking at the meeting of the Wandsworth, Wimbledon, and Epsom District Gas Company (reported elsewhere to-day), Mr. H. E. Jones called attention to their experience. Last half year, the Company did very well in new heating connections; so much so that the capital expenditure on meters and stoves amounted to £8514. He puts this down as much to the influence of the advance in householders' coal bills as to normal growth. In all probability, too, some part of it may be traced to the increasing shortage of domestic servants, owing to the several other opportunities now open to them for earning good money and having more leisure. Labour-saving appliances must be adopted to meet the decline in the supply of domestic servants; and gas-cookers and gas-fires are excellent labour economizers. There are good reasons here why the opportunity should be taken of impressing on householders—if they desire to, at any rate, partly relieve themselves of the coal trouble, to have the comfort of gas-fires during next winter, and enjoy their aid in saving labour—the necessity for getting the fires installed early for the winter season in view of the scarcity of gas-fitters.

A striking remark made by Mr. Jones, when speaking of the expenditure of capital upon new stoves, was that it would have been a very foolish thing indeed if, although money was dear, the Company had refused the applications for gas-heating appliances. We agree with him; for this is an exceptionally good time to introduce gas-heating appliances to householders who perhaps have declined to look at them before. Moreover, we are no believers in a progressive industry such as that of gas supply making a break in its work in those newer parts of business the development of which—as much, and as fast, as possible—is vital to continuous prosperity. No excuse ought to be allowed to prevail in the matter; and no gas undertaking we hope has been foolish enough to shut-down any branch of business. As surely as this was done, so surely would a vast amount of injury be occasioned to the exploitation work of the past; and the discontinuity would create an immense lag when it was desired to resume the business. Meantime some possible consumers of gas for heating purposes might, to the gratification of the central station engineers, become patrons of electricity for heating purposes. It does not do to let people get and harbour the idea that one does not want business of any kind within the boundaries of utility of the product offered, or that there is any incapacity to meet demand. Both would be false impressions in respect of the gas industry. But, whether false or not, it is better and safer that the idea should not get a footing; for as surely as it does, it will gain ground. We therefore hope that there will be no lack of energy, to the extent of capacity to execute orders, in developing the business in gas-consuming appliances, especially under the popular—and paying—hiring-out system.

The excellent point made by Mr. Jones as to the foolishness of refusing to hire-out heating appliances, notwithstanding that money is dear, so as to maintain a continuity of the development of this business, is unconsciously accentuated by the temporary financial position of the Wandsworth Company. The Company are in a strong situation in regard to the selling price of gas. The initial figure to ordinary consumers has been 1s. 9d.; but the price was put up 4d. last quarter. Even then the initial charge is only 2s. 1d. This price is in itself a good reserve. But capital is dear, the disposable balance on revenue account is temporarily *nil*, and the "gilt-edged" securities in which the reserve and other funds are placed could only be sold at the present time at considerable loss on cost. Yet, said Mr. Jones, it would have been a very foolish thing indeed to have refused these applications for gas-stoves and other heating apparatus. Those concerns that are not at the present time pushing business owing to the dearness of money should reconsider the question from the point of view of lost opportunity and the damage that must ensue from interruption of business and from a sudden cessation of those methods of cultivation that were previously applied. Whatever may have been the views that in this regard had possession of some gas administrators at the beginning of the war, there is certainly no possible room for them now. The dearness of money is an established fact. But it must not be forgotten that money is going to be dear for a very long time; and surely it is not contemplated that business development is to be delayed until in the distant future—a future the conditions of which are beyond our horizon to-day—things get easier. Gas undertakings with administrations holding any such opinions are to be pitied; and those undertakings should be avoided as suitable quarters in which to invest fresh capital. There is another point to be considered. The capital investment on gas appliances for hiring-out is usually very profitable; the rentals being, as a rule, amply sufficient to cover interest, depreciation, repair, and all charges. Therefore, there is no excuse on this score for preferring a lapse rather than a continuity of business in the hiring-out of apparatus. The Government authorities, too, are fully alive to the work that the gas industry is doing in connection with the war; and it may be taken that the Treasury will not look unfavourably upon granting their approval to the raising of capital for an industry which the more it is developed the greater it can render aid to the country in providing several essential requirements to the production of a lasting peace.

There is another side to the financial position of the question under consideration. The trading condition of the gas industry has fairly well settled down under war conditions. We now know the worst in regard to coal. Rates of freight for those companies that have not their own ships are the source of greatest obscurity. The residual products are not doing at all badly. Gradually the loss of gas consumption is being reduced. The price of gas has been raised; and a less sum is required for dividend and interest on capital, owing to the increase in the price of gas. On the other hand, certain new charges have come upon most concerns, due to the war. Already through the increase in the price of gas, there are signs of some undertakings increasing their carry-forward, and so consolidating their position. There are some chairmen, too, who are talking of the prospect of the increases in price of gas being of short duration. Better by far

will it be, for consumers and proprietors alike, if the price of gas is maintained sufficiently for a period to provide the necessary funds for maintaining as high as possible the level of development of the use of gas-consuming appliances. It is up to all gas administrators to ensure that the future of the undertakings the interests of which are their charge shall suffer as slightly as possible from the ill-bred and uncouth circumstances of the present. The effects of these circumstances must be in proportion to the energy expended and the methods employed in lightening them. Where there is lethargy and neglect, there, of course, the whole weight of effect must be brought upon the concern to its disadvantage—present and future. The use of gas for heating in the domestic and industrial realms is, we believe, going to far outstrip in volume the consumption of gas for any other single purpose; and therefore it is our opinion that no excuse should be allowed to weigh against development. While saying this, it would almost seem, looking at our advertisement columns the last two or three weeks, that some of the firms doing business in gas-heating apparatus have taken it into their heads temporarily to hide themselves; yet they have also an interest in promoting an unbroken continuity of the gas-heating business, which applies to summer as well as to winter.

Signs of Higher Freightages.

The rate of freightage from the Tyne to London has continued at 7s. to 7s. 6d. for some time now, or at rather more than half the rate that intermittently existed with other extravagant figures at the latter part of last year and during the earlier months of this year, and over twice as much as the rate prevailing prior to the war. The influences that caused the rate to recede are the bringing into the market of a number of interned vessels, the coming into operation of the Coal Exports Regulation Committee (which set free a part of the inordinate number of vessels that were carrying on an unusual coal traffic with neutral countries in close touch with Germany), the coming of the lighter months of the year, and the fact that some of the larger charterers of vessels found in the high rates of freight an incontrovertible reason for becoming shipowners on their own account. But now, if we read correctly between the lines of an article that has appeared in the "Newcastle Daily Chronicle," the way is being paved for another upward movement of freights. It is mentioned that we are now nearing the period when the overseas carriage of the great crops will influence the freight market, and that at the present time this influence may be increased because the tonnage of commercial vessels is not being added to, as has been customary of late years. It is also pointed out that while high freights may have a tendency, together with the dangers of the seas, to check overseas shipments, the needs of the nation will be as considerable as ever for corn, cotton, &c., and probably there will be importation from longer distances. In another part of the article, there is reference to higher charges for fuel, wages, and insurance, and to the delays at ports of loading and discharge, and *en route*.

What does all this portend, if not to prepare the way for advances in the rates of freight to figures, which, in view of the height of existing rates, will be highly extortionate? The shipowners ought to take a lesson from what has happened to the coalowners in respect of the regulation of coal prices; and the determination of the Government that they will not allow the whole community to suffer unduly in order to enrich, through any immoderate charges, a comparatively small section. The string of high costs due to the war has been played upon long enough by the shipowners. Higher costs are admitted; but they are a measurable quantity. The Gas Light and Coke Company have shown that, including interest and depreciation, the cost last half year of bringing coal by their own ships from the Tyne to London ranged from 4s. 4d. to 3s. 2d. per ton; while the average increase of the Commercial Gas Company was 1s. 4d. per ton more than in the corresponding half of last year (this including a steamer hired at the market rate of freight). The Wandsworth Gas Company, too, by their own vessels, brought coal to London last half year at 4s. per ton. There is therefore a good margin of profit in the 7s. to 7s. 6d. now being charged, without finding fresh excuses for further raising the rates. The "Newcastle Daily Chronicle" thinks that "the results of the better freights that have been known "now for about a year must, on the whole, have been satis-"factory to the shipowners," which is an extraordinarily clever and original thought, modestly put. The modesty is emphasized by the further remark that the market values of the shares of some of the cargo-carrying companies have risen by from 40 to 50 per cent.; while, through the reduction of passenger traffic, the stocks of certain of the great liner companies have fallen from 10 to 15 per cent. The shipowners, like the coalowners, appear to be an easily tempted race of men; and patriotism?—well, with them business is business, and their patriotism must find expression in some form that does not interfere with money-making.

Road Authorities and Pipe Owners.

We have the promised article [see *ante*, p. 133] by Mr. Reginald Brown, M.Inst.C.E., on the subject of the improvement of the relations between road authorities and those who have, for the purpose of public service, to use the subsoil of roadways for the accommodation of their means of distribution. It is a laudable object that our contributor has in view; and therefore we confidently ask for a studious consideration and discussion of the case he presents. If all road authorities took the same conciliatory and fair attitude as Mr. Brown, all would be well. It should be so, because if two bodies have mutual obligations which have a common end, they are the local authority whose business it is (among other things) to maintain the roads for the advantage of the locality, and the company who—also for the convenience and the advantage of the locality, and for limited reward in the way of profit—take upon themselves the supply of gas or water. Any locality unfortunate enough to be without these conveniences and advantages—without good roads and without the public services gas and water companies provide—would not be in the position to develop the same as other districts.

In this connection, we may at once dispose of a point made by our contributor. He deals with the views as to the rights and obligations of those who use the subsoil of roads, and of those who have to make and maintain the roads in sound state. He admits that the pipe owners are large ratepayers; but, in doing so, he asserts that one of the arguments of such owners is that: "We pay our share "of rates to the other services of the local authority, and "get no value, direct or indirect, from doing so." We were not aware that any gas company adopted such a foolish attitude, so long as their assessment is fair, rates reasonable, and the money devoted to good purposes of local maintenance and improvement. The part of the rates to which gas companies have objection is that which represents extravagance, and that which is required for the maintenance of pauper electricity undertakings—undertakings municipally carried on in such a way that competition with private enterprise is altogether unfair. But they have no objection to rates spent on real improvements which will add to the attractions of, and so help to develop, the district residentially, industrially, and commercially. To so object would be to oppose the upkeep and expansion of their own scope for business; and from such upkeep and expansion they do derive a very direct advantage. On the other hand, there is a direct value to a local authority from the presence of such concerns, quite apart from their contributions to the local exchequer. Gas undertakings especially are good employers of labour; but above all they and their cognates, by providing local conveniences, subscribe to the development and therefore rateable value of a locality, and, the lower the price at which they can render the service, the greater the popularity of a district. Therefore it is a wrong idea to look at this question of road openings, reinstatements, and maintenance from the narrow point of view that the companies are makers of profits—limited ones in the case of gas and water. That roads have to be broken up is a condition inseparable from the provision of something locally necessary, and as much an essential in the local machinery and the local advancement as the provision and maintenance of good roads. The very nature, and the statutory control, of gas, electricity, and water supplies set them above ordinary business ventures, but local governing bodies (when not themselves the undertakers) have in many cases developed the bad habit of looking upon those who engage in these supplies as merely speculative intruders to be bled to the uttermost penny, and harassed with perseverance, although often the largest ratepayers in an urban area.

Encouraged should be a better mutual understanding between road authorities and those who have to carry on their work of distribution by subterranean means; but it is

very necessary to the understanding that both parties should first get into proper focus the relative positions of the one and the other, in order to appreciate that their respective work is essential to the district. Mr. Brown tells us that road authorities feel very "sore" on the point as to road openings. These openings are absolutely necessary; the time of making them is another matter. We are bound to say there are companies who are blameworthy in respect of inopportune work; but, on the other hand, there are road authorities and district surveyors—some of the latter are sticklers for red tape and obsequious respect—who are also blameworthy. Give and take! Some road authorities and district surveyors expect gas and other companies to do all the giving. Perhaps Mr. Brown has not seen a side of this matter that pipe owners see—not, thank goodness, in all districts, but in many of them. "Municipal engineers," he writes, "should notify the companies of any intention to "extensively repair or pave a road, so that the latter may "attend to any known defects in their mains, or expedite "the laying of new mains should any be required at a "comparatively early date." This is precisely what some municipal engineers do not do; or rather the notice given is sometimes so inadequate that there is no time, before the road men are well on with their work, for an engineer to get the necessary authorization from his Board, to make the needful testing of the pipes, and to plan for the work to be carried out. We quite agree that in a good many towns the procedure advocated by Mr. Brown is followed with "mutual advantage to both companies and road authori-"ties." What is found good in those towns should surely be common practice. This is one way in which there might be improvement, with resulting efficiency and economy.

Small openings for service laying cause much trouble; and gas companies are impeached by Mr. Brown with being the biggest culprits in this respect, especially since the introduction of the prepayment meter system. The frequency, however, is wearing down. Were it not, it can be claimed that one of the best pieces of work the gas industry has done for every locality has been in the working-class districts (which are not usually the best from the road condition point of view), for prepayment meters have improved the home and cooking conditions of the poorer people, and relieved the atmosphere of a large part of the domestic smoke. Whatever injury has been done to roads and pavements by this work has been more than compensated for in other ways. Of course, an opening of some kind must be made in order to connect services; but, where possible, we do not see the slightest objection to the "drawing-in" system being adopted under tar-paved and such-like paths. But this is not possible where, through the character of the soils or possible electrolytic action, service-pipes require special protection around them in order to prevent rapid deterioration.

Passing by the matters in the article of especial concern to water engineers, we think that Mr. Brown is too general in his charge that gas and water companies do not, as a rule, employ men skilled in road making, but men who are merely mainlayers. In the areas of the larger concerns, the regular men know the district well, and the nature of the roads; the local authorities who deal with foundations and the upper crust, and consolidation by steam-rollers, cannot produce men more capable in trench and refilling work. Many companies, too, employ contractors whose men have experience the country through. At the head of a company's gang of mainlayers is usually the man who has had the longest practical experience of the work, or has shown exceptional intelligence and aptitude; and, in well-ordered companies, inspection of the work in progress is frequently made by the engineer or district superintendent. It is rather a narrow view that "the general superintendence by "the company is for the purpose of the company, and for "which they get a monetary return; the general superin-"tendence by the road authority is for the purpose of the "general public, and for which they get no monetary "return." But if the rest of Mr. Brown's article means anything, the road authority would gain very considerably in economy by giving sufficient supervision to these matters —and economy is synonymous with monetary return. Thus it seems to us that, at any rate with the larger companies, Mr. Brown's suggestion is already complied with, that they should employ men who are not only skilled in mainlaying, but also in road repairs. Our contributor repeats his advocacy of the use of mechanical rammers; and he sees no objection to local authorities providing the rammers, and a man to work them—the company paying certain charges. But we are afraid that it would not be a practicable proceeding for the local authority to have one or more men to assist the company's men in their mainlaying operations, and be responsible to the road authority for proper reinstatement—the cost of these men being borne by the company. Who would be the master of these provided men? and to whose instructions would they work? In connection with the Metropolitan Water Board Act this session, an attempt was made to get the filling-in clauses of the Metropolis Management Act applied to the new aqueduct the Board are constructing; but nothing more than surface reinstatement was allowed to the local authorities.

The idea of our contributor is that mutual interest should promote better relations. His article is a friendly essay to this end, and as such should be encouraged. He gives us a reasoned argument, and a number of suggestions. But how different this all is from the efforts of powerful road authorities to squeeze from companies new powers of a one-sided character, which, if not conceded out of Parliament, mean heavy expenses in meeting their opposition in the Committee rooms. In the main, however, Parliament has refused to give the road authorities more than is reasonable and their common law rights. Their excessive claims do not lie in the same road as the proposals made by Mr. Brown, in his article now under notice, to secure greater efficiency in the execution of necessary work.

Adventitious Consumption.

There were some remarks in the speech of Mr. Charles Hussey, J.P., to the proprietors of the Croydon Gas Company on Friday, with which one can agree in the presence of the circumstance of the maintenance last half year of the gas consumption, as in the case of the Company over which he presides. He was speaking of the consumption of gas, and pointed out that, while the Company had had a slight increase in the half year, they had had little or no output of gas for special war purposes. Then he added that he was not sure that a largely increased sale of gas at the present time, if due to special consumption for military purposes, was to be desired, owing to the fact that, while a source of revenue, it involved a heavy strain on the productive side of the undertaking at a time when the steps thereby necessitated were both costly and difficult. Quite true when the consumption merely means a large temporary increase. But there are many gas undertakings which would have suffered considerably more than they have done had they not had, during this war time, a good amount of special consumption with which to help to fill the "aching void" in their business. There are gas concerns situated in districts where public and shop lighting and certain of the local industries have been so much affected that there would have been a large volume of business short of the normal, if it had not been for the special consumption. If the war-promoted extraordinary business in gas supply could have been allotted to areas according to the effect that the war has had upon normal gas consumption, we could name a few gas companies that would have held up their hands for the favour of special consideration, and glad of the opportunity.

Gas-Oil Imports.

Bearing on the recent remarks of Sir Corbet Woodall, that, unless the Admiralty can do something to relieve the situation, there might be trouble over the supply of gas oil, through the shortage of tank-steamers, we see from the returns published in the "Petroleum Review" that the total imports of gas oil from Jan. 1 to Aug. 2 amounted to 51,737,350 gallons. Of this quantity, 1,370,000 gallons were Mexican; and the whole of the remainder came from U.S.A. The Gaslight and Coke Company last half year alone used no less than 11,675,747 gallons. With such a figure, and knowing from the Board of Trade returns something as to the quantity of oil normally required for carburetted water-gas manufacture (which will be greatly increased in times when coal is as dear as last half year and at present), the supply does not appear to err on the side of amplitude; although it stands well in comparison with the total import of gas oil in the whole year of 1914, when it was rather more than 79 million gallons. The price of gas oil in bulk is quoted by our contemporary at 4½d. per gallon, *ex* wharf.

The Exports of To-Morrow.

The problems of national income and expenditure have lately been put before the country in a style which suggests that the whole matter is of a very complex nature, and not the subject of certain plain and almost homely economic laws—such as that, for the balance to be on the right side, exports should exceed imports, just as income should exceed expenditure. Mr. W. H. Cowan, M.P., one of the Directors of Messrs. Parkinson and W. & B. Cowan, has written an article in the "Daily Telegraph" in which he puts the position in a delightfully simple way, so that all who read may understand. Exposition, however, is not the main intention of the article; it is to emphasize the fact that the nation's position of economic advantage depends on its capacity for increasing export trade, and to make certain suggestions, as Mr. Cowan is well able to do, having had part of his training in the practical world of manufacture and commerce. As a nation, he points out, it is impossible for us at the present time to decrease our expenditure; and so we can only enlarge our national income by increasing the amount of goods which we sell over the seas. An excess of imports over exports for any protracted period under the abnormal conditions now prevailing, means a constant and serious drain on the gold reserves of the country. Mr. Cowan therefore urges the manufacturers—and there are thousands of them—who are not concerned in munitions work to, after satisfying internal necessities, devote their attention to export trade more than ever before; for, by so doing, they will be serving the best interests of the country. He admits that in certain trades, war conditions may have so far limited the possibilities for exportation as to render any hope of increasing it futile. This, however, need not preclude the heads of businesses to-day considering the question with a view to the conditions of to-morrow. It is essential that it should be realized at once by those business men who have not in the past grasped to the full their opportunities for overseas trade, that it is their patriotic duty, as much as their private interest, to realize these opportunities, and seize them more readily and completely than they have done before.

The Rivalry of Gas and Steam.

There is always danger in being a prophet. Sir Frederick Bramwell essayed the *rôle* once. It has never been forgotten against him. By 1931, steam-engines were, in his view, to be relegated to museums, owing to their displacement from practical work by gas-engines. "Engineering" has been inquiring how far the prediction has come true, or rather how definite are the signs that it will be fulfilled. There are a few more years to roll before 1931, and who knows that the gas-turbine may not by then be an accomplished fact? We are not going to say that it will not be, though appearances are against it. When the prediction was made, the gas-engine could give 1 indicated horse power hour from 12,000 B.Th.U., whereas the steam-engine required 15,000 B.Th.U. per indicated horse power hour. Then came Parsons' steam-turbine, and gave steam a new lease of life, and an unrivalled efficiency for large powers. Our contemporary does not see any room for material improvement in the gas-engine, whereas the margin for the utilization of steam is still substantial. Admitting the truth of the latter statement, the lesson afforded by Sir Frederick Bramwell's prophecy should cause statements to be guarded regarding the future of the internal combustion engine. Of course, our contemporary has to admit that, in the case of small power plants—and these are more in demand than mammoth ones—the internal combustion engine is very much superior to its steam-driven rival. A 60-horse power gas-engine gives about as good an efficiency as one twenty times as large; while a 60-horse power steam-turbine is invariably a steam eater. It is only when the output is large that steam begins to hold its own. Much, of course, depends upon the load. Comparing gas-producers and steam-boilers, stand-by losses are much less with the former than the latter; and hence when work is intermittent, the gas-engine gains accordingly. For ordinary purposes, the range of utility and convenience of the gas-engine is greater than that of any steam-driven plant. Fuel is at the present time dear for steam purposes; and while our contemporary does not assert that solid fuels can compete with the net cost of producer gas (with bye-products recovery), it seems inclined to consider the application of the gas under steam-boilers and the use of steam-turbines, rather than putting the gas into the cylinder of an internal combustion engine for the direct production of work. The appropriateness of this depends on the size of the plant, the work to be done, and the heat losses that there are between the combustion of the gas and the utilization of the steam in the turbine.

The Fallen and the Disabled.

The exhortation to take no thought of the morrow does not apply to the major part of temporal things in these times. If Great Britain had not taken thought of the morrow when determining the rate of the growth in the strength of her Navy and in promoting its efficiency, we should to-day have been writhing under the heel of the vilest tyranny ever created by man. Had thought not been taken for the morrow's coal and oil supplies of the gas industry, an important public service would have been largely at the mercy of those who were animated by the sordid desire to get their "full pound of flesh" in the form of profit out of the circumstances existing solely through the war. There are many things arising from the war and associated with the future to which thought must be given. There are the dependants of the brave gas workers who make the supreme sacrifice in the cause of the country; there are those of the industry's men who will return home incapacitated, and unable to resume their former work. The staff and workmen of the Manchester Gas Department, looking forward, have started doing their part to make provision for those of their fellows who fall or are disabled. When the war began, the staff and men decided to make regular weekly contributions to the National Relief Fund; and during the year they have done well. But there is not that acute distress in the Manchester area that was anticipated; and the level of employment is good. This being so, it has been decided to now divert contributions to a fund for the benefit of the members of the staff and workmen who are incapacitated in action, or to assist the dependants of the fallen. This is an excellent scheme; and a local correspondent gives to Mr. Fredk. A. Price, the Superintendent of the Department, the credit for originating it.

Comparative Municipal Statistics.

We have received from the Clerk to the London County Council a volume of comparative municipal statistics for the year 1912-13, compiled by the Council from information supplied by the authorities of the several towns and from other sources. The contents of the volume are most interesting and instructive to those engaged in municipal work. One of its main objects is to ascertain whether any economies can be effected by a yearly comparison of the cost of municipal services—in other words, whether any standard of expenditure upon particular services can be laid down, even approximately. It is pointed out that there is a tendency for the cost of nearly all public services to reach a minimum in towns of about 90,000 population, though the services of gas and water tend to decrease in cost as the population of the administrative area increases. A second object of the compilation is to ascertain whether, by comparison, information can be obtained which will tend to the increase of efficiency. For instance, the value is obvious of trustworthy official figures in relation to tramways, the supply of water, gas, and electricity, and in connection with the improvement of health and the elimination of disease. Necessary, too, are comparative municipal statistics in the interest of the reform of local self-government, which, it is admitted, is rapidly becoming chaotic. The statistics are divided into about 39 sections, and include maps and diagrams—the sections embracing water, gas, and electricity. The gas statistics refer to the following municipal undertakings: Birmingham, Manchester, Leeds, Glasgow, Edinburgh, Dundee, Aberdeen, Belfast; and to the following companies: Gas Light and Coke, South Metropolitan, Commercial, Liverpool, Sheffield, Bristol, Newcastle, Cardiff, Swansea, and Dublin. The price of the volume (which is published by Messrs. P. S. King and Son, Limited, of Westminster), is 5s., or 5s. 4d. post free.

In this country, the "Nottingham Express" writes, one is apt to think of natural gas as a mere scientific curiosity of no substantial commercial importance. Some figures that were recently published show, however, that in America the investment in the natural gas industry exceeds £80,000,000, and that the revenue therefrom amounts to nearly £20,000,000. The general use of gas for heating and cooking is largely responsible for these surprising statistics. It is estimated that in American cities the average domestic consumer of artificial gas burns annually 30.000 cubic feet, at a cost of from £5 to £6. But the same heat value can be obtained from 18,000 cubic feet of natural gas at a cost not exceeding 30s. and sometimes as low as 18s. As the supply of natural gas is such excellent business, new deposits are being constantly sought for, especially in the middle of the Continent. It is reported that natural gas and petroleum are more widely distributed than any other mineral product in America.

PERSONAL.

Mr. JAMES HEMPTON has been appointed Gas and Water Manager under the Newtownstewart (co. Tyrone) Rural District Council.

In this column last Tuesday reference was made to the fact that Lieut. GEORGE D. BIDWELL had been wounded in the Dardanelles. Later information is to the effect that he has a severe wound in the back, but is progressing satisfactorily. The casualty occurred during the new landing effected in Turkey between the 6th and the 12th inst., when there was a heavy list of casualties, especially among brother officers of Lieut. Bidwell.

OBITUARY.

The "Journal für Gasbeleuchtung" of the 31st ult. reports the death, at the Western battle front, of Herr AUGUST KNOKE, the Works' Assistant at the Hadersleben Gas, Electricity, and Water Works.

This year's Chairman of the Gas Committee of the Horncastle Urban District Council, Mr. WILLIAM GALE, died yesterday (Monday) week, at the age of 64. He had lived in Horncastle for forty years, was on the old Local Board, and had been a member of the Urban District Council since its formation.

In the course of their report to the stockholders, the Directors of the Bournemouth Gas and Water Company announce, with regret, the death of Mr. J. C. BENWELL, F.C.A., who for 24 years had acted as an Auditor of the Company, as he had also of several gas companies—including Croydon—whose meetings are regularly dealt with in the pages of the "JOURNAL."

The death is announced, as having taken place last Thursday week, of Mr. JOHN BARR, a Managing-Director of Messrs. Glenfield and Kennedy, Limited, and probably one of the best known, one of the most influential, and one of the most highly esteemed citizens of Kilmarnock. Mr. Barr was frequently consulted by water-works engineers of large and important cities before water supply schemes were entered upon; and his advice was always highly valued as that of an experienced and reliable authority. At various times he read papers before Technical Societies with which he was connected.

Last week's Australian mail brought news of the death, on the 8th ult.—after being bedridden for more than two years—of Mr. DANIEL WARREN, formerly Manager of the Footscray (Victoria) Gas-Works, belonging to the Colonial Gas Association. Deceased was born in England, at Portsmouth, in March, 1832. At an early age he was in the Royal Navy, and served on H.M.S. Himalaya and St. George, and won medals for service in the Crimean war—these bearing clasps endorsed "Baltic," "Crimea," and "Sebastopol." At the conclusion of the fighting, he went to Victoria (in 1856) as a gas-making expert, and was induced to remain as Manager for the Geelong Gas Company. In 1878 he transferred to the Footscray Gas Company, of which he was Managing-Director until four years ago, when, following on the death of his wife, he suffered a breakdown. Deceased was at the time President of the Victorian Gas Managers' Association.

The sad circumstances under which Mr. WILLIAM BLAKEY, the Accountant of the Gas Light and Coke Company, met his death last Wednesday are reported in a later column of to-day's issue. In this reference to the tragic event, it is only kind and perfectly true to intimate that the war, with all the extra official work and responsibility which, in common with so many others, it brought to Mr. Blakey, imposed a strain which his nervous, highly-strung temperament was unable to withstand. Needless to remark his accounts were in perfect order. He was a most able man at his work, and enjoyed the esteem and utmost confidence of Directors and colleagues alike. He entered the Company's service some 24 years ago, and succeeded to the post of Chief Accountant on the retirement of Mr. A. Bevis in September, 1912. His illness began some three months ago, when the Directors, realizing the possibility of slow progress, granted him unrestricted leave of absence and other considerations calculated to relieve him of anxiety and accelerate his recovery. He was 42 years old, and leaves a widow and two young children.

Bye-Product Coke-Ovens in Canada.—At the annual meeting of the Canadian Mining Institute, a paper was read by Mr. Walsh, in which it was stated that the total number of coke-ovens in operation in Canada at the commencement of 1914 was 1720, while 1375 were idle at the time. Of these coke-ovens only 730 are of the bye-product recovery type; the remainder being of the beehive pattern. The amount of coke made during 1913 was roughly 1,500,000 tons. The consumption of coke in Canada is much greater than the production. The net imports in 1913 were roughly 650,000 tons, making a total of 2,150,000 tons. If all this coke were made in bye-product ovens in Canada, about 20,000,000 gallons of tar would be produced yearly. As it is, the production is roughly, under normal conditions, about 9,000,000 gallons. The greater cost of installing the bye-product ovens, and the lack of markets for the bye-products, has no doubt hindered their substitution for the non-recovery oven. At the present time in Canada no benzol is produced from the coke-oven gas.

ELECTRICITY SUPPLY MEMORANDA.

THE cost of everything requisite to the electricity industry has gone up—the same as is the case with all other industries. The greater number of electricity supply undertakings, being municipally managed, have for many years been enjoying capital at a fairly low rate of interest. But the palmy days in this respect have gone, and are not likely to return. Dearer money, and dearer things to buy with money, constitute the current position. With the latest Government security paying 4½ per cent., and the Government guaranteeing its safety, municipal authorities cannot expect to get money at a cheaper rate for their trading enterprises. The Treasury have now announced that loans required for local purposes with a repayment period not exceeding thirty years are to bear 4½ per cent. interest, and not exceeding fifty years 4¾ per cent. Regarding the dearer materials that have now to be bought, coal is not the only thing; but the term may be made to include the whole run of necessaries, from plant and cables to the apparatus required for the consumption of electrical energy. Therefore, perhaps, on the whole, it is a good thing that the Local Government Board have to confine sanctions for new loans to work that is indispensable—more especially in connection with the war. Because with the high cost of money and materials, there would be, by present lavish expenditure, a permanent abnormal burden placed on the concern. In cities and towns where the central station engineers have been fortunate in having prior to the war a modern type of generating plant installed, they have had the gratification of finding that, although coal costs per ton have gone up considerably, economies effected in fuel have on the year's account counterbalanced the total increased expenditure on coal. The Norwich electricity undertaking is an example of this. In spite of the fact that the cost of coal last year increased from 16s. to 17s. 4d. per ton, there was an actual saving of £700 on fuel, due to the higher efficiency of the plant. This, however, applies to comparatively few concerns; for there are not many that have had of late large new units of generating plant installed. Moreover, of the total outgoings on an electricity undertaking, fuel represents a relatively small proportion. Capital charges, distribution costs, and other expenditure may run up to 70 to 80 per cent. of the total outgoings; and it is in these directions where in all undertakings, whether blessed or not with high efficiency generating plant, higher costs will bear heavily. Only recently a well-known electrical manufacturing company put up the price of certain of their manufactures by as much as 25 per cent.; and this is not surprising when all things are considered. Electrical apparatus demands expensive material—copper for example—and workmanship.

Costs on the Up-Grade.

Copper.

The market price of the last-named material has lately shifted about between £80 and £90 per ton. But the "Electrical Review" is rather hopeful that the growing production—it describes present output as "colossal"—will affect fundamental conditions, and bring down the price. It says that output is rapidly extending in Africa and South America. It confesses, however, that the statistical position of copper in Europe is not much of which to boast; but it thinks the possibilities are that there will be a further increase in available stocks as time goes on. This is a fairly safe prediction, as time is illimitable. It is not known whether the "Review" was able to take into account the copper position in Germany, because "Electrical Engineering" says that, on the authority of an article which appears to have been written with sound information at command, Germany has sufficient copper for her Army requirements "for years." But this tremendous store seems to be made up in curious fashion. The German Government have already taken possession of all stocks of raw and partly manufactured copper; and other potential sources of supply are the stock of manufactured copper in the possession of the public (which is put at 2 million tons); and the copper roofing on public buildings. Registration, too, has been made of all the copper, manufactured or otherwise, held by public undertakings—including electricity concerns. It looks as though the German Government are preparing to strip the country of its copper goods, if stocks of the raw material will not hold out.

Domestic Electrification.

We have been told by politicians and economists in high places that it is necessary for the country's financial well-being to reduce imports as far as possible and to increase exports to the utmost extent. This economic law from all accounts the British manufacturer of electrical apparatus does his best to defy. He makes apparatus which spells ruin to progress in domestic electrification, and compels the electrical engineer to turn to goods produced elsewhere—in America, for example; so increasing imports, and making his own apparatus unattractive not only at home but abroad. No one, of course, would use a piece of electrical apparatus that was now made in Germany, lest, in the causes of "Kultur" and the murdering of babies and women, it concealed a bomb. The attack on British manufacturers of electrical appliances has been revived by Mr. A. C. Bostal, Sales Manager of the Croydon Electricity Department; and the "Electrical Times" has slapped him on the back for being a good and courageous fellow, for coming to the Front,

and taking part in trying to arouse British makers of defective electrical appliances to a sense of their duty. In passing, however, he states his opinion that no great progress will be made in domestic electrification, except in such almost negligible things as irons, fans, shaving-pots, and such-like trifles, other than perhaps in the better-class houses, until electricity suppliers are blessed with hiring powers, or are allowed to apply the hire-purchase system. On this matter, it is unquestionably a great drawback to the electricity supply industry that it is so largely dominated by municipal trading, which—as the funds with which speculation is made are public money, and not that of private individuals as in the case of companies—must be kept under control and within limits.

The Case against the Manufacturers.

As to the British manufacturers, what Mr. Bostal alleges against them is that to the poor mechanical work put into their appliances is due the great majority of breakdowns; and these mechanical defects, according to his experience, could easily be remedied by care. Mr. Bostal proceeds to compare American work with British—to the disadvantage of the latter. For a number of years, he has been "experimenting" in a large laundry—poor, long-suffering laundry!—to find a satisfactory electric laundry iron loaded to 750 watts. He tried every style of British-made iron which appeared to him to be good; but he could not find a combination of flexible wire, connector, and element which would stand the hard usage required of laundry pressing-irons. Every week, without exception, it was necessary to put something right. We repeat "poor, long-suffering laundry!" However, Mr. Bostal thinks he has now found what he requires in an American production. The American irons are in use now; and for two whole months—note the time!—he has not touched them, the contacts are as clean as new pins, and the flexibles show no signs of fraying. He seems surprised. Fancy no signs of marked deterioration in two months! We hope that the "Electrical Times" has not printed "months" instead of "years." However, speaking generally of British-made electrical apparatus, the critic finds that small lock-nuts are put where inaccessible, and no spanner is capable of gripping them. Bolts are left projecting beyond the nuts. Leading-in wires are run-in in such a way that only the makers can say which is which. This does not exhaust the list of small defects which help to make the burden of the complex electrical life so heavy. Looking at larger things, Mr. Bostal complains that, if a hot-plate breaks down, it is necessary to send it back to the makers; and the expected and realized reply is, that the hot-plate is in a dirty condition, that water has evidently caused the element to collapse, and that the cost of repairing same will be 15s. 6½d. "Poor, deluded user! Were you not told that, under electrical operation, there was nothing to do but to prepare the food, put it into the oven or on the hot-plate, and the electrical apparatus would do the rest without demanding any trouble on your part? Were you not told there was no smell, no dirt, no anything but good results with electrical operation? Were you not told that all your kitchen worries would be ended, and you would be money in pocket?" Yet with a little spilling of water there is a breakdown, a hot-plate is unusable, the apparatus cannot be run again until repaired, and bang goes 15s. 6½d. to provide another hot-plate to, in all probability, meet with the same fate. Hot-plates, Mr. Bostal holds, should be so constructed that there is no necessity to stand over the pots and swab-up every drop of water that runs over, or keep the surface of the hot-plate free from condensed steam. He does not say how the construction is to be effected; but that is his opinion. The "Electrical Times" agrees with him. The apparatus, it says, must be made proof against such things, because it is "hopeless to train users to treat electrically heated utensils in a manner totally different from that which they adopt with vessels heated over a gas-ring or coal-fire." And so say all of us.

The All-Electric House.

What are described as all-electric houses have been erected near Glasgow by Mr. George Hamilton, a local builder. The houses appear to be of the bungalow type, containing only four, five, or six rooms, so that they would be something about the size of residence that the average British artizan would need for himself, wife, and small family. The style of the dwellings will be gathered from the facts that they are rough-cast, with red asbestos tiled roofs. All lighting, heating, cooking, and hot-water supply is carried out electrically—the equipment consisting of an electric water-storage tank, a cooker, and electric-fires in the living and bedrooms. Nothing is said as to how many lamps and radiators are in use, or how much work is done by the water-storage tank and the cooker. The price that is charged for the whole of the current used for lighting, heating, cooking, and hot water supply averages 0·77d. per unit. Let us repeat this because it is interesting. The price that is charged for the whole of the current used averages 0·77d. per unit—an average price for domestic purposes that is without equal in the kingdom. What have the other electricity users of Glasgow to say about the people in these small houses getting lighting current at just about ¾d. per unit? Now at this low average price, Mr. W. W. Lackie, the City Electrical Engineer, estimates the average annual consumption for these four to six roomed houses at 10,000 units per annum each. 10,000 × 0·77d. = £32 1s. 8d. a year. But Mr. Hamilton lives with his family in one of the houses. He is a prosperous builder; he can afford to waste money upon fads. He puts Mr. Lackie's estimate to shame by using during twelve months' residence 16,000 units, which, at the low average cost of 0·77d. per unit, work out to £51 6s. 8d. a year; and this without any allowance for capital cost, repairs, maintenance, and renewals. The commercial and bank clerks living in Suburbia, with an income only two, three, or four times the amount Mr. Hamilton spends on current at 0·77d. per unit, will ponder long over this experience, and Mr. Lackie's estimate, before following the example. The lighting, heating, and cooking bill at 0·77d. per unit seems altogether out of proportion to the size and character of these red asbestos tiled bungalows. Our information is obtained from the "Electrical Times;" but speaking of these same "all-electric houses," the "Electrician" says: "It is a regrettable fact that only a very small percentage of station engineers and contractors show any enthusiasm in this regard; and they are therefore unable to point the way in their particular districts, and thereby give real encouragement to their consumers." We wonder if the writer of these words has an all electric-house. It is easy not to practise what one preaches.

The Local Audit and the Gas Company.

A paper bearing the title of the "Democrat and People's Journal" is entitled to some respect. Such a paper is published in Dundalk; and most respectfully in one matter we dissent from its views. The Dundalk District Council run an electricity supply business; the Dundalk Gas Company carry on a gas-supply business, and are, as things go in Dundalk, large ratepayers. When the Local Government Board audit of the district accounts was in progress recently, the Gas Company thought well to be represented by their Manager and Secretary (Mr. G. Airth) and their Auditor (Mr. Smyth). The previous day these gentlemen demanded an inspection of the books of the Council, including those of the electric power station. This demand appears to have been refused. Before the Local Government Board Auditor objection was raised to the representatives of the Gas Company having access to the books of the Electricity Department, on the ground that they are business rivals. The result of the protest was that they were asked by the Official Auditor to submit their objections in writing. The "Democrat and People's Journal says: "It appears to us that it would be totally against sound public policy that the representatives of the Company should be permitted to pry into the internal affairs of the electricity undertaking—the Department and the Gas Company being rivals in business." Now let us point out to our local contemporary that the local rating authority (no doubt members of the Urban Council have something to do with this body) have a perfect right in making their assessments of the Company's property to look into their accounts. Point No. 1. Equally the Gas Company being one of the largest contributors to the local exchequer have a right to see that the Council are conducting their affairs properly. If the District Council ran a newspaper, and accepted advertisements at a cut-rate that did the "Democrat and People's Journal" trade injury, what would be the song then of this organ of "light and leading" in Dundalk? Point No. 2. Surely the Council have nothing to hide if they are conducting their electricity business on sound business principles. What are they afraid of? Point No. 3. There is no analogy such as our local contemporary attempts to draw between the position calling for comment and rival local tradesmen prying into one another's business. The private tradesmen are not working with public money; and they cannot fall back on the rates if they so conduct their business that deficits are made, and depreciation and other things are not properly provided for in their accounts. The electricity concern is a public business carried on by public money; and there is the power to fall back on the rates for support. Surely one of the largest ratepayers—a ratepayer, though business rival, who would have to share in any loss on the rival undertaking—has a right to see that the business is conducted upon rational and safe lines. To argue the contrary, may suit the "Democrat and People's Journal," but not commonsense business men.

Chemical Society and Organization of Science.—It has already been stated that, in pursuance of the desire of the fellows to assist the Government, the Council of the Chemical Society had constituted themselves a consultative body, to meet at frequent intervals, to consider, organize, and utilize all suggestions and inventions which might be communicated to them, and report on them to the proper authorities. In response to a circular issued to the fellows asking them to forward such suggestions or inventions, a number of replies have already been received; and in dealing with these, the Council are to have the assistance of special committees, each of which have been formed by a kindred society. Among the bodies taking part in the work are the Society of Chemical Industry, the Institute of Chemistry, the Institution of Mining and Metallurgy, and the Physical Society. Each of the societies will nominate six experts, who, with two members of the Council of the Chemical Society, will form a Committee to consider matters referred to them by the Council. In addition, a general Committee is being formed which will consist of twenty members; two being nominated by each of the co-operating societies. This Committee will consider general policy, not merely on questions directly relating to the war, but on all matters in which the opinion of a thoroughly representative body of chemical scientists is desirable.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Forthcoming Annual Meeting.

THE programme was issued last week by the Secretary and Treasurer (Mr. Peter B. Watson, of Wishaw) for the fifty-fourth annual meeting of the North British Association of Gas Managers, which will be held at the Freemasons' Hall (No. 96, George Street), Edinburgh, on Friday, the 3rd prox. The chair will be taken at 10.30 a.m. by the President (Mr. J. B. Scott, of Cowdenbeath). This year there will be no excursion; but the Chairman and Directors of the Cowdenbeath Gas Company have issued invitations to a dinner for the members and lady friends at the North British Station Hotel on the evening of the meeting day. The Council have decided that there will be no lecture this year under the "William Young Memorial Trust."

In addition to the President's Address, the proceedings will include the reading and discussion of the following four papers:

"The Training and Education of Gas-Fitters," by Mr. R. W. Cowie, of Dalkeith.

"A Simple Pressure-Raising Device," by Mr. James J. Scott, of Lower Largo.

"Gas Measurement: Past, Present, and Future," by Mr. William Gordon, of Edinburgh.

"Sales of Sulphate of Ammonia at Home and Abroad," by Mr. F. C. O. Speyer, of London.

Subsequently, there will be a presentation of an illuminated address to Mr. George R. Hislop, of Paisley, in commemoration of his fifty years' service in the gas profession.

Report of the Council.

The report of the Council, which will be submitted for confirmation, points out that the membership on June 30 was 253—viz.: Ordinary members, 160; associate members, 14; extraordinary members, 72; honorary members, 7. Intimation is given of the death of two ordinary members—Mr. William Blair, of Helensburgh, and Mr. Thomas Lighbody, of Renfrew. Five members tendered their resignation last year; and there is a similar number of new members recommended for election. The Council announce that during the past year two applications for assistance from the Benevolent Fund were received, and, after inquiry, a donation was granted in each case. There is an amount of £662 to the credit of the fund.

SIXTY YEARS AGO.

From the "Journal" dated Aug. 10, 1855.

CONSIDERING the limited area now left by science for metaphysical and psychological speculations, it has often struck us with surprise that no dreamer of the phantasmagorial school should ever have thought of explaining how it happens that some people are to be found in this world of that peculiar temperament which prompts them to neglect whatsoever they are called upon to perform, and to strive anxiously for an opportunity of intermeddling in affairs with which they have neither connection nor knowledge. The fact that such people exist is quite undeniable; but upon what particular organ or "bump" we are to lay the blame of this unhappy defect remains still a problem. The motions of these people are of a retrograde character, and analogous to those of the crab; so that if this crustaceous animal could be made to give up its reason for preferring to walk backwards, perhaps we might arrive at some definite conclusion with respect to the individuals in question. What they are required to do, they always leave undone; and where their interference is neither solicited nor desired, they rush in with the foresight and impetuosity of a blind horse. When this disease [for such one must regard it] seizes upon a single individual, the consequences are for the most part injurious to himself alone; but when many persons are attacked simultaneously, the result invariably proves disadvantageous to the public. Of this latter form, we have now an unhappy example before us, as evidenced by the conduct of Her Majesty's present advisers. Everyone knows that the chief—indeed, almost the sole—duty deputed by the British nation to the Palmerston Ministry was the vigorous and successful prosecution of the Russian war. All other matters were deemed insignificant and secondary—in fact, the nation may be said to have undertaken to manage its own internal affairs, and to put up with any amount of inconvenience without a murmur, provided its honour and interests were zealously promoted by the success of our arms abroad. . . . Alas, it would appear that, intent only upon advancing their influence at home, they have allowed matters to take their own course abroad.

At the Manchester meeting of the British Association (being held from Sept. 7 to 11), Professor William A. Bone, F.R.S., will take the place of Professor H. B. Baker, F.R.S., as President of the Chemical Section. Professor Baker is unavoidably prevented from attending the meeting.

OVERLOAD CAPACITY AND INDIVIDUAL AND GROUP DRIVING.

IN "Electricity Supply Memoranda" for Aug. 3, criticism was made of some superficial comments in the "Gossip" columns of "Electrical Industries" on Mr. H. C. Widlake's articles in our pages on the subject of "Power Production: The '£ *s. d.*' of the Question." Before the criticism in the "Memoranda" was published, our contemporary permitted itself to have a turn at a succeeding instalment of our contributor's article. But again superficiality predominated; so perhaps it is an inseparable characteristic of "Gossip."

In the course of his articles, Mr. Widlake wrote: "The driving of isolated machines by separate motors means that each motor must be so rated as to be able to supply the maximum amount of power demanded by the particular machine to which it is coupled. This would mean that during the greater part of its time a small, and consequently a comparatively inefficient, motor would be operating at a poor efficiency under an uneconomical load factor." Upon this "Electrical Industries" says:

> If anything is clear from these rather muddled sentences, it is that Mr. Widlake is ignorant of the overload capacity of the electric-motor. Moreover, he says nothing about the fact that, when a works is driven by a gas-engine, that engine—which possesses no overload capacity worth mentioning—must be equal in capacity to the maximum demand of the factory, although the average demand may be, and would be, in the vast majority of cases, very much less.

It will be observed that here the old and vexed question of rating is pressed into service again—the most cherished shot in the electrical man's locker when he desires to confuse an opponent. In an article in the "JOURNAL" for June 22 last [p. 695], treating of a laundry installation, Mr. Widlake dealt very fully with the overload capacity of the gas-engine as that capacity actually exists, and not as the chimera which the electrical fanatic would like to represent it to be. It would not be a bad idea if the author of "Gossip" would try his hand at the article referred to, and deal with that piece of real practical experience. An electric-motor admittedly possesses considerable capacity for negotiating an overload. But this characteristic has been greatly abused, and always will be, by fanatics who persistently run an improperly rated machine until its state is such as to enable it to be used for culinary purposes with a considerable degree of success, and who, ignoring the fact that a machine is being run to its destruction, talk and write at length on "overload capacity."

Any prime mover—whether a steam, gas, or electric motor—is rated by its makers on a perfectly well-defined basis; and any attempt to run it on a load in excess of that for which it is designed, can only lead to detrimental results. A plain business man who has (say) a 25 B.H.P. motor calls it by that designation, and by no other. But the electrical enthusiast who is fighting the gas-engine alludes to it as a 20 B.H.P. machine, with a 25 per cent. overload capacity; and in his frantic desire to get there first, places himself in line with Louis De Rougemont, Ananias, Munchausen, and other celebrities whose speciality was a playful disregard of the truth. One thing is certain, the price paid for a prime mover is based upon the maximum power which the prime mover is capable of exerting—no matter to what degree one may juggle with terms.

Criticism was also made by the same writer of what Mr. Widlake had to say on individual and group driving. His article was written around, comparatively speaking, small power plants; and, unless the circumstances are very special, individual driving in connection with such plants cannot be regarded in the light of a commercial proposition except where electrical energy can be obtained at an unusually low figure, as capital charges in connection with a number of small and inefficient motors would wipe out any saving which this method of driving might otherwise effect. As readers are aware, many large power plants obtain current for their motors at an absurdly low rate, in order to keep a high day-light load factor on the public supply stations which would otherwise be running light; and this preferential treatment has been, and always will be (unless regulated by Act of Parliament) the subject of endless discussion, litigation, and controversy.

The losses attendant upon the use of transmission gearing have always been dressed-up by the interested electrical man in the cloak of a bogie with which to frighten the power user who contemplates driving his machines from some central power motor, unless this motor happens to be an electric one, when the electrical enthusiast may actually expound some theory as to why such losses with the same shafting, pulleys, belts, &c., will be less with an electric motor than with a gas or steam engine. It has been proved again and again that, with a good modern gas or steam plant (let us be fair), transmitting through the medium of modern well-lined-up gearing, such losses can be reduced to a minimum, and power be *delivered* at a rate per B.H.P. considerably lower than that achieved by the use of individual motors working on a public supply. The subject of individual and group driving is one on which much has been said and written; and the advantages or disadvantages of these two methods, as compared with running from a central power motor working in conjunction

with line shafts, cannot be threshed out in a general manner, but only after careful consideration of each particular case.

Ingenious is the description applied to Mr. Widlake's suggestion for dealing with cases where a factory driven by gas power is either wholly or partly illuminated by electricity. Our contributor's suggestion was: "Such cases may be advantageously handled by pointing out to the proprietor that a small dynamo driven from the line-shafting will generate all the power likely to be required at a cost of something under ½d. per unit, according to the rate charged for gas for power purposes." Our contemporary's illuminating comment was: "Oh, Mr. Widlake!" In other words, it was incapable of arguing the matter, and so left it at that. It would be interesting to see some figures in support of the implied absurdity of a dynamo driven from a line-shafting being capable of generating current at about ½d. per unit.

Reference was also made to Mr. Widlake's assumption of a 100 per cent. load factor. His figures gave this favourable basis to the electric-motor as well as to the gas-engine and plenty of material was provided in the article to enable the intelligent power user to adjust the arguments to his own particular load factor.

Finally, the whole matter is one which can be reduced to the commercial basis of pounds, shillings, and pence; and this is precisely what the "gossiper" of "Electrical Industries" does not seem anxious to base his criticisms upon. All he does is, as we said in "Electricity Supply Memoranda" on Aug. 3, to content himself with pecking about in a superficial manner like a hen in search of grubs.

COKING AND BYE-PRODUCTS.

By "Event and Comment."

The Recovery of Naphthalene.

On very few bye-product coke-oven plants in this country is any attention paid to the recovery of naphthalene. Indeed, this substance is more frequently regarded as a bugbear, as, if not properly dealt with, it is liable to cause great trouble on the plant. Gas engineers are only too well aware of this latter fact, and usually they take precautions to prevent its deposition in the mains. In the hot direct recovery processes, unless great care is taken, naphthalene troubles are liable to occur; but in the semi-direct and indirect processes, they are not so frequent. In cases where a benzol recovery plant is installed, almost the whole of the naphthalene in the gas is absorbed by the creosote scrubbing oil, and it is quite possible, with very little trouble, to recover a good deal of this; and it must be borne in mind that crude naphthalene will find a ready sale at almost any time. The recovery of naphthalene from the scrubbing oil has also a further advantage, in that its removal from the soil allows the latter to remain in circulation for a much longer period. It is well known that creosote oil gradually increases in viscosity during the time it is circulating through the benzol scrubbers. This viscosity is very largely due to naphthalene, and ultimately it becomes so great that the oil is too thick to deal with, and the pipes conveying it round the plant tend to become choked. It is then necessary to stop the plant and steam-out the pipes. To recover the naphthalene, the hot oil issuing from the still after the benzol has been removed is run into large shallow pans. It should be allowed to remain there for at least 24—and preferably for 48—hours, with occasional agitation. The naphthalene crystallizes out, and settles to the bottom. It should be fished out with a perforated scoop and allowed to drain. It is then best pressed on the draining board, and packed into bags. In many benzol plants nowadays a fraction which boils at a temperature of 130° to 160° C. is separated. This can also be treated in a manner similar to the above, and the naphthalene recovered from it. It is essential to allow a considerable time for settling, as the separation of the naphthalene only takes place very slowly.

With the development of the manufacture of synthetic dyes in this country, it is more than likely that there will be a considerable demand for pure naphthalene, for this is the basis of artificial indigo and other dyestuffs. Again, too, the use of naphthalene for internal combustion engines is being developed, and promises to be highly successful; so that there are great possibilities for this product. Pure naphthalene is prepared from the crude product in the following way. The crude product is freed as far as possible from adhering oil, and is melted with about 5 per cent. of concentrated sulphuric acid. The excess of acid is drawn off, and the naphthalene distilled. It is also sometimes sublimed from a shallow iron pan, being heated by a steam coil. The product so obtained is collected and recrystallized from petroleum spirit, and the pure product obtained. Unless the subliming process is carefully carried out and close attention paid to the cooling of the vapours, an excessive quantity of the naphthalene is lost. Naphthalene is also recovered from the middle oil fraction obtained in the distillation of tar. This is the fraction which is used for benzol absorbing purposes, and it is treated in exactly the same way as described above in connection with the benzol plant.

Toluol Recovery and Beehive Ovens.

In these notes a fortnight ago, and also on other occasions, the writer has referred to the continuation of beehive coking—much to the detriment of the country, owing to the loss of much raw material for high explosives. Surprise at the inaction of the Government was expressed. It is now gathered that a move has been made, and that the Government officials are trying to impress upon people the wasteful character of beehive coking. It is unfortunate they have not gone a step further, and given some indication as to how to obtain the largest possible yields of benzol, toluol, &c. As already pointed out, gas engineers have been invited to assist the Ministry of Munitions in the matter of organizing supplies of toluol. However estimable these gentlemen may be, and often are, in their own profession, they are—in the majority of cases—distinctly out of place in this instance, for they are mostly totally unacquainted with the practical side of benzol recovery and rectification. In this respect, a writer in the "Yorkshire Post" a few days ago made the following remarks:

> Advisory committees have been appointed to assist the Government with regard to increasing the quantity of toluene, but not much has been heard up to now. Why on earth the Government appoint gas engineers, who, prior to the war, had no experience in the running of a benzol recovery plant, while men of highest scientific attainments in this branch are pushed aside, is difficult to understand.

In Germany, the coke-oven experts were quickly utilized in their proper spheres; and it is surely time this was done here too.

A WATER UNDERTAKINGS RETURN.

Ordered to be printed by the House of Commons in July of last year, there has just made its appearance—in the form of an unusually bulky Blue-Book—a "Return as to Water Undertakings in England and Wales." The return is divided into two parts; and that the information given extends to some 600 pages need cause no surprise, when note is taken of the ground covered.

The first part gives particulars of every water undertaking in England and Wales, while the second shows how each district and parish is supplied with water. The provision of works necessary to supply, from any natural source, water for domestic purposes to not less than ten houses or to standpipes has, for the purposes of the return, been considered an undertaking, whether or not the supply be given under specific statutory powers, and whether furnished gratuitously or for profit. Supplies which are regulated by Special Acts, but in connection with which the water distributed is obtained from other undertakings, have also been included. For the most part, the information given has been corrected to Jan. 1, 1914; and the return, it is stated, may be regarded as the first instalment of the detailed and comprehensive investigation of the whole subject of surface and underground water supplies which has been recommended by various Royal Commissions and Committees. Any point that may be raised as to the appropriateness of publishing such a huge statistical volume just at the present moment—when everybody is busy telling everybody else how they [the other persons] can economize—will no doubt be met, and quite fairly so, by the remark that the work was started, and most of it was done, long before the war was even thought of—the original inquiry forms having been sent out three or four years ago. The information received was then revised, so as to bring it up to the end of 1913.

By reference to Part I., the investigator is able to ascertain, with the smallest possible amount of effort, the powers (if any) under which the undertakers are authorized to supply water; the limits within which they are authorized to do so; the places actually supplied; the sources of supply, their nature and sufficiency; and particulars as to the works, and the quantity and quality of the water supplied. Part II. shows the area and population of every district in England and Wales, and the number of houses therein; the number of houses supplied with water from a piped service; the names of undertakers providing a supply of water; and the source, nature, and sufficiency of the supply where there is no piped service. From this it will be gathered that the return, unlike those issued annually which relate to gas undertakings, does not deal in any way with the financial aspect of water supply. The particulars that are given refer to the undertakings of 786 separate local authorities, the Metropolitan Water Board and 34 other joint authorities, 200 companies with statutory powers, 84 private companies, and 1055 private proprietors. The undertakings owned by local authorities include, of course, some of the largest in the country. First come London, Manchester, Liverpool, and Birmingham; then come four other places each of which supplies more than 12 million gallons per day. These are followed by eleven other local authorities supplying between 5 and 12 million gallons; while there are in all 130 of these bodies who furnish more than half-a-million gallons a day. It may be added that the daily figures for the four first named for 1913-14 are given as: Metropolitan Water Board, over 244 million gallons; Manchester, 44 millions; Liverpool, 34½ millions; Birmingham, about 21¾ millions. Apart from the Metropolitan Water Board, the largest joint undertakings are the Tees Valley Water Board, who distribute 15 million gallons daily, and the Derwent Valley Water Board supplying in bulk just over 10 million gallons a day to their constituent authorities, for distribution by them. The South Staffordshire Water-Works Company, supplying nearly 16¾ million gallons a day, have the fifth largest water undertaking in England and Wales, the two next

largest companies being those at Bristol and Newcastle-on-Tyne. Altogether there are 66 companies each supplying over half-a-million gallons daily.

The return is prefaced by a preliminary memorandum extending to over forty pages, which itself contains a great deal of useful information. In the first place, there is a history of the water supply of the Metropolis, from the year 1543—when the Hampstead Water Act, the first Private Act of Parliament relating to London water, was passed—down to the present time. Then there is a chapter on water supplies outside the Metropolis, in which some particulars are given as to early municipal undertakings. It would seem that Southampton was first in the field, with the establishment of a municipal supply in 1420, followed by Hull in 1447, and Bath in 1500. The earliest Local Act authorizing a municipal water supply appears to be one of 1541, conferring powers on the Mayor and Dean of Gloucester. Next came the well-known Act of 1585, obtained by Sir Francis Drake, for Plymouth. A brief account is given of legislation of a public character dealing with the question of water supply, and reference is also made to the different inquiries into the matter which have been held by Royal Commissions. The provisions of the Public Health Act of 1875 enable a water company to sell or transfer their undertaking to a local authority by agreement; but apart from this facility, which has not been extensively taken advantage of, about a hundred Special Acts have been passed since 1876 giving power to local authorities in England and Wales to purchase the undertakings of water companies supplying their districts.

As to sources of supply, it is remarked that for some years the supply of underground waters—wells and boreholes—has been on the increase, and the proportion of underground to surface waters used has been constantly growing. As a matter of fact, the statistics show that at the present time 340 local authorities, 13 joint authorities, and 142 companies derive supplies from wells and boreholes. The total amount of underground water supplied by piped services for domestic purposes—not including water derived from surface springs or stand-pipes—is roughly estimated at 285 million gallons a day. It is shown that 200 local authorities, 14 joint authorities, 89 companies, and 116 private proprietors filter their water. In the great majority of cases, the supply of water by undertakings is constant. It appears from the return that water is now supplied by a piped service practically to every densely populated place in England and Wales; and most of these supplies are wholesome and quite adequate. The greater part of the population which has a piped service of water, too, is now supplied municipally.

It is pointed out that the powers of the general law have not sufficed to give local authorities or companies all the powers necessary for their undertakings; the chief defect being that no machinery is provided for taking water rights compulsorily. This being so, a note is made of fresh legislation which has been suggested on the subject of water supply; the proposals being as follows: That Rivers Boards should be established to control the watersheds of the various rivers of England and Wales, the prevention of pollution of their waters, and the management and distribution of the water supplies derived from them, and of the underground supplies of their areas; that the Local Government Board should be empowered to make Provisional Orders for the compulsory acquisition of water rights; that in schemes for supplying towns from any particular river basins provision should be made for supplies to be furnished to the neighbouring villages; that section 52 of the Public Health Act, 1875, should be amended so as to further safeguard the rights of local authorities with regard to parts of their districts placed within the limits of statutory companies and not supplied by them; that local authorities should be empowered to make bye-laws regulating the construction of shallow wells; that local authorities should be empowered to make bye-laws as to the provision of proper water-fittings; that it should be made the duty of the local authority to obtain orders to close all polluted wells; that local authorities should be empowered to provide, or to cause to be provided, a supply of water for a group of houses, and to apportion the expenses as they deem just among the owners having houses within a reasonable distance of the source of supply, with an appeal to the county council or to a court of summary jurisdiction, in place of the provisions in the Public Health (Water) Act, 1878; that owners should be compelled to lay on water where a pure and wholesome piped supply is provided; that further power should be given to prevent the occupation of a new house until a proper water supply is provided; and that county councils should be empowered to combine contributory places in different sanitary areas for the joint provision of a supply of water.

Palace of Industry for London.—It is intended, in the early part of 1917, to open as a permanent institution a Palace of Industry in London, with the idea of holding two fairs, in spring and autumn respectively, in which will be exhibited the main industries of the Empire. The palace will be managed by an Advisory Council consisting of representatives of all the trade associations of the United Kingdom. The site chosen is at Willesden Green, where 44 acres of land have been secured. Only wholesale manufacturers and their agents will be allowed to show their products; and admission will be limited to traders and other possible customers. In short, the fairs will be run on the same lines, and for the same object—the pushing of trade—as the Leipzig Fair.

THE ROAD MAKER AND ROAD BREAKER.

A PLEA FOR CONSIDERATION BY ONE FOR THE OTHER.

By Reginald Brown, M.Inst.C.E., M.I.Mech.E., &c.

In a paper read by me before the 1915 annual meeting of the Institution of Municipal and County Engineers,* I put forward certain of the difficulties arising from the continual breaking-up of the highways by statutory companies, and made certain suggestions as to the remedies which might be adopted for the mutual advantage of both local authorities (as road makers) and statutory companies (as road breakers). This article will, therefore, I hope, appeal to "Journal" readers because of the utmost importance of the subject to gas and water authorities. It is in reality a plea for the consideration of one body for and by the other; and I am convinced that if any reasonable suggestion or suggestions can be put forward both of the bodies concerned will be only too pleased to adopt same if it can be shown that (1) it is to their mutual advantage, and (2) that it entails no more cost than under existing conditions.

Briefly speaking, statutory companies have the right to open a road maintainable by the inhabitants at large after giving three days' notice—or without notice in case of emergency—of their intention to do so to the road authority, and subject to the supervision of that authority. In addition, they are bound to replace the trenches as quickly as possible, and to maintain them for three months after making good, or so long as the trench continues to subside, but not exceeding twelve months. On the other hand, the road authority are to supervise the opening and filling-in. If they fail to do so, then the companies may proceed without such superintendence.

The road authority, being the parties responsible for the proper maintenance of the roads, must also inspect the trench from time to time to see that it is properly kept up; and if it is not, then they have the power to do the necessary work and charge the persons in default with the cost thereof. All this is common knowledge; and on the face of it there seems no reason why any difficulties should occur—if both companies and road authorities do their duty, and act in conjunction with each other.

"Road Breakers" as Ratepayers.

Now what are the views of both sides? Take those of the "Road Breakers" first. They say, in effect: We are a body of persons having statutory powers to supply the general public with necessities. The public must have our goods, and the duty cast upon us can only be carried out by laying pipes in the highways. We have laid out and continue to lay out, large sums of money in erecting works for the supply of water and gas, all of which are subject to rates. What is more, every yard of pipe laid by us is also subject to rating. Hence we pay our share of the ordinary highway expenditure, whether it be for making new or maintaining existing highways, although we may have little advantage from same. In addition, we pay our share of rates to the other services of the local authority and get no value, direct or indirect, from doing so. Our profits, in many cases, are limited; and the public gain advantage of this restriction by reduced charges. The greater the expense we are put to, the higher the charges to our customers—the public. We want to carry out our statutory duties; but we do not want to be subjected—nor do we think it fair we should be subjected—to irksome regulations and charges as to maintenance of the trenches we are compelled to open.

The Duty of Road Makers.

The "Road Makers" say, in effect: We are a body of persons elected by the ratepayers of a district of which the road breakers are part, and charged with the statutory duty of maintaining the public highways. It is our duty to see that this maintenance is carried out at the most economical rate, and in the most efficient manner, consistent with the amount of money at our disposal. We agree that the road breakers are carrying out a statutory duty, and that the public must have the goods; and we also agree that they—the road breakers—are large ratepayers and pay the ordinary rates. But we join issue with them when they say that no value, direct or indirect, is enjoyed by them. We are quite aware of the limitation of profits; but we think that, in view of their monopoly, this limitation is quite a correct thing. We also say that the continual breaking-up of the road for pipe laying is the greatest culprit in the case of highway maintenance.

For the purpose of this article, it is only necessary to deal with the claim of the road breaker—that he should not be subjected to irksome regulations and charges for maintenance, and also with the claim of the road makers in connection with these same regulations and charges. To do this it is necessary to analyze the present methods, and see if there is anything which requires modification.

A company desire to lay a pipe, give notice to the road authority, open the ground, lay the pipe, fill in the ground, remove the surplus, and finally either maintain themselves or pay the road authority for doing so. The only things that matter to the local authority in connection with this procedure are the necessity of opening the road, the receipt of the notice, and the reinstatement and maintenence of the surface disturbed. But the efficiency and the cost of both reinstatement and maintenance depend upon the filling in.

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* See "Journal," July 6, p. 26.

Closer Relations between Breakers and Makers.

First as to the necessity of opening the road. Road authorities feel sore on this point. A road, maybe, has just been put in repair, and directly afterwards a statutory company comes along and tears it up again for the purpose of either laying a new main, a house connection, cutting off or re-connecting a house supply, or repairing some defect. Now most of these could be obviated with a little foresight. New supply mains are not laid every day; and it ought to be a simple matter for gas and water engineers to be in touch with the municipal engineer, so that mains may be laid before any road repairs are put in hand. But companies are not the only culprits—the local authorities themselves sometimes break-up the roads directly they are made for the purpose of laying new mains, because the road repairs cannot wait until the necessary formalities have been gone through before the requisite financial arrangements have been carried out.

In this connection, I suggest that the companies should not take the advantage of only giving the statutory notice, but should give the road authority as long a notice as possible. Gas and water engineers know when it is probable that new mains will require to be laid, and they should notify the municipal engineer of this. On the other hand, the municipal engineer should notify the companies of any intention to extensively repair or pave a road, so that the latter may attend to any known defects in their mains or expedite the laying of new mains should any be required at a comparatively early date. This procedure is followed in a good many towns with mutual advantage to both companies and road authorities. [Point No. 1.]

Service Laying.

Laying new mains is, however, not the greatest culprit. It is principally the small trenches crossing the road from crown to kerb that cause so much trouble. Gas companies are the biggest culprits in this matter, especially since the introduction of the prepayment by meter system. Water companies are not so much at fault, inasmuch as the house services are generally laid in a road before it is "taken over" by the road authority; but they are culprits to a lesser degree for services to houses in existing roads. In this case, it is surely possible for the companies to save a little inconvenience by "drawing-in" services below tar paved and such like paths, as no amount of repair to the surface can reinstate the paths in such unbroken surface as originally existed. [Point No. 2.] With flagged paths, there is not so much objection to opening. I will deal with the carriageway portion later on.

Cutting-off and Reconnecting Supplies.

Another fault is the opening of a road for cutting-off a supply to a house—either for non-payment of rates or because the property is empty—and again opening the road for the purpose of reinstating the supply. The water companies (except probably the Metropoliton Water Board) are the greatest culprits in this respect. Gas companies, on non-payment of the gas charges, can remove the meter and summons the person in default for money due, or, in the case of empty property, can also remove the meter if necessary, and there is no trouble in reinstating the supply. With the water company, however, the usual procedure is to cut off the water on non-payment of rates or for empty property. This necessitates opening the road on two occasions—first for cutting-off, and then for reinstatement. In the Metropolis, the water is not allowed to be cut off for non-payment of rates. The procedure is to summons the person in default for money due; and what is suitable and satisfactory in the Metropolis can surely be applied by companies working in provincial districts. [Point No. 3.]

As to empty properties, there is somewhat of a difficulty with water companies, as in the majority of instances there are no means of cutting off the supply except at the main. But I suggest that, even in this case, the cutting off might take place at the stop-cock just inside the premises. [Point No. 4.]

In repairing some defect in a service or a main, it may, of course, be necessary to open-up the highway. But here, again, the defect may be caused by the use of heavy traffic on roads with weak foundations, or the services being laid too shallow; so that all the fault of openings for repairs must not be placed on the shoulders of the company. [Point No. 5.]

In dealing with the present procedure, we first have the notice to the road authority. This is necessary so that the direction of the line of pipes may be agreed upon, and also to give an opportunity for supervision by the road authority. But there is no hardship on the companies in this respect.

The Art of Opening and Filling-In.

I come now to, probably, the most important difficulty of all, and that is the "opening and filling-in" after laying a main or service. Gas and water companies as a rule do not employ men skilled in road making, but "mainlayers;" and a man who is suitable for the latter may be entirely unsuitable as a road maker. He does not see the importance of keeping the material removed from the trench in such a way that it can be replaced in an exactly similar order on its return, neither does he see the importance of thoroughly ramming the soil, so as to leave as surplus little more than the area occupied by the main itself.

Supervision.

The companies will probably say the duty of supervision rests with the road authority, and if the work is not done properly the fault lies with that authority. Now do let us look at the matter from a common-sense point of view! When one person employs another to do certain work, he first takes care that the employee is one who is capable of doing it in its entirety; and after giving him general instructions of what is required, the employee is expected to carry out the work in a satisfactory manner without having someone continually in attendance to superintend. Gas and water companies when laying mains—it may be in several parts of a district at one time—do not always engage foremen to superintend each (and every part of each) main being laid, because this is not only unnecessary—it would be wasteful. In many cases, one foreman only is employed to give general superintendence to all the minor mainlaying jobs. Surely if this is thought sufficient by the companies, they ought not to expect more from the road authorites. The general superintendence by the company is for the purpose of the company and for which they get a monetary return; the general superintendence by the road authority is for the purpose of the general public, and for which they get no monetary return.

In addition to this, the fact that the trenches are in all parts of a district, and there is no definite time when such trenches are to be opened or filled-in, it is next to the impossible for adequate superintendence to be given; hence the capabilities and good faith of the companies' men have to be relied on to a very considerable extent—in fact, one might say wholly. Therefore statutory companies should employ men who are not only skilled in mainlaying, but also in road repairs. [Point No. 6.]

I feel sure that companies will at least concede the necessity of replacing the material in trenches in the order in which it is removed, and also of the proper consolidation of the trenches during refilling operations. But how is this to be secured? I say by proper superintendence and the elimination of the human equation as far as possible. I claim that superintendence, in the ordinary accepted term, can be dispensed with if the men are trustworthy—*i.e.*, if Point No. 6 is conceded by the companies and accepted by the road authorities.

Mechanical Aid in Ramming.

The proper filling-in and reinstatement of trenches is just as important for one as it is for the other. To the company it means less expense for maintenance (if they maintain direct); to the authority, it means a better surface to the highway and also less expense (if they maintain the trenches at an agreed schedule of prices). It is generally acknowledged that to refill a trench properly there should be two rammers to one filler; so that the material may be punned in thin layers. But in many instances the proportion of men is reversed, with a consequent greater liability to sinkage. Again, even with rammers (men and tools) there are rammers and rammers—no two men will ram alike, no two men will give the same consolidation even with the same weight rammer.

I therefore claim that the only consistent method is to ram by mechanical means. This would be a simple operation, and would only entail a small portable oil-engine and compressor, or even a compressor driven from a steam-roller, with flexible tubing supplying compressed air as the motive power to one, two, or more portable rammers. The rammers need only be comparatively light and small tools, somewhat similar to a riveter, and could have interchangeable ramming feet for ramming round the sides of the pipe or in the main body of the trench. By this means the trench would be rammed quickly and in thin layers, and, in addition, the consolidation would be almost perfect. [Point No. 7.]

Putting aside the cost of the machine for one moment, such an arrangement would, I am sure, more than repay itself by more efficient consolidation and lower "after maintenance," even if the companies had to bear the cost of such a machine. It ought to satisfy a road authority if a company made arrangements for them to open the trench and reinstate at the cost of the company without any further charge for maintenance. What do the companies and local authorities say to this suggestion? The companies will probably say that such an arrangement could not very well be made, as they keep special gangs of men for this purpose. On the other hand, the road authority might say that they could not keep a gang of men ready to go at any time when ordered by the company, because such a gang would not always be employed.

A Suggestion.

Both excuses are legitimate, and I suggest a half-way—a happy medium, between the two. It would not be a difficult matter for the road authority to have one or more men—according to the size of their district—who could attend at the spot where the trench is to be opened and assist the company's men in the work, and be responsible to the road authority for its proper reinstatement. Such an arrangement would not be more costly to the company than under the existing conditions, because they would employ direct—one man—less, and would only pay the road authority for the time the latter's man was engaged on the company's work. [Point No. 8.]

As to the filling in, the mechanical rammer could be provided by the road authority, and be worked by their own man—the company paying the authority the same as they now pay for reinstatement, or the actual cost, and be freed from liability as to maintenance. [Point No. 9.]

Points for Consideration.

Now let us summarize the points referred to:

(1) Gas and water engineers, on the one hand, to give as long a notice as possible to the municipal engineer before

laying new mains, and the municipal engineer to notify the gas and water engineers as long as possible before any large repairs or paving a street; so that the companies could expedite the laying of any new mains required in the immediate future—or, better still, periodical meetings between the various engineers with this end in view.

(2) Services under path to be laid in on the "drawing-in" system under tar-paved and such-like paths.

(3) Water companies not to open road to cut-off water for non-payment of water rate, and consequent re-opening for re-instatement of supply, but to summons the person in default to recover money due.

(4) Water companies not to open road to cut-off water supply to empty houses, but to do this inside the private premises, near the controlling stop-cock.

(5) Blame for opening road to repair defects in pipes not always to be placed on the shoulders of the company.

(6) Companies to employ not only trustworthy men skilled in pipe-laying, but who are also skilled in road repairs.

(7) The employment of mechanical means to replace manual labour for ramming material in trenches.

(8) The road authority to supply one man when called upon by the companies to assist their men in opening and filling-in and reinstating, and the company to pay the actual wages of the man for the time employed. This man to be responsible to the road authority.

(9) The road authority to provide for the use of the companies a mechanical rammer, or rammers, to be worked by the authority's own man, and company to pay charges for re-instatement and maintenance as now paid, or actual cost. Companies to be freed from liability for maintenance.

Let all gas and water companies and road authorities look at these points seratim, and, if needs be, let all or any of them indicate their defects and suggest something better in place thereof. Certain it is that all my suggestions mean mutual advantage to both sides; and I fail to see that any extra expense is put upon either. But "One man's word is no man's word. Justice demands that both be heard."

LIGHTING AGENTS AND FIRES.

In a volume of "Comparative Municipal Statistics (1912-13)," just issued by the London County Council, and referred to in a paragraph elsewhere, particulars are given as to the causes of fires by electricity, gas, and oil:

Fires Caused by Electricity, Gas, and Oil.

—	Electricity.	Gas.	Oil.	Number of Electricity Consumers.	Number of Gas Consumers.
London . . .	152	210	195	143,980	1,223,995
Birmingham .	18	60	20	7,435	165,784
Liverpool . .	17	15	32	—	149,525
Manchester . .	25	30	—	12,568	185,295
Sheffield . . .	9	6	6	5,464	97,375
Leeds	5	7	1	10,108	112,884
Bristol . . .	5	32	23	4,227	61,021
Newcastle . .	8	7	1	—	117,925
Cardiff . . .	—	4 & 6	1	2,813	37,268
Swansea . . .	2	5	3	2,771	21,539
Glasgow . . .	17	14 & 20	4	27,848	286,883
Aberdeen . .	3	4	4	2,947	42,539
Belfast. . . .	1	9	1	3,453	78,824

In some cases data as to the number of fires were not available. From the general statistics relating to gas and electricity supply, we have extracted the number of consumers of gas and electricity; and when one examines the figures in relation to the number of fires caused by each agent, a tale is told that is highly favourable to gas, and shows that it cannot be truthfully charged by its worst enemy with being a less safe agent than its competitors.

GAS AT THE PANAMA-PACIFIC EXPOSITION.

The use of gas for cooking, heating, and lighting throughout the Panama-Pacific Exposition, when considered in connection with the most complete Collective Gas Exhibit in the Palace of Manufactures, brings gas into its own, says Mr. E. C. Jones, of San Francisco (the President of the American Gas Institute), in the Monthly Bulletin of the American Commercial Gas Association.

Describing this exhibit,* Mr. Jones says that in a beautiful pavilion at the north end of the Palace of Manufactures are gathered together the results of the latest developments in the uses of gas. The exhibits are artistically arranged and presided over by competent demonstrators; and visitors may follow the gas business from the crude materials from which gas is made, to the ultimate rendering of brilliant light rays which combine efficiency and economy in illumination. The lighting effects of the exhibit are provided by the Welsbach Company and the General Gas Light Company. The Welsbach Company have installed a bungalow in which are displayed the latest designs of semi-indirect lighting; and residence lighting is featured so as to emphasize the artistic beauty, brilliancy, and economy of incandescent gas lighting. The General Gas Light Company occupy a very prominent corner space, in which is displayed a complete line of the latest types of lamps they manufacture, and the mercury valve control for distance or ceiling lighting, also an excellent line of gas-irons. Both of these exhibits make a feature of the evolution of the gas-mantle throughout the different stages of the process of manufacture. The Collective Gas Exhibit has demonstrated the fact that the best advertisement of gas for illumination is light. The General Gas Light Company and the Welsbach Company came to the front with an offer to furnish all the necessary lighting fixtures, glassware, and mantles for the complete equipment of the exhibit and the maintenance of these lamps.

When it is considered that the exhibit is lighted by 14 five-mantle arcs, 61 three, four, and five mantle semi-indirect fixtures, 80 bracket lamps, 8 inside arc lamps, and 14 outdoor single-mantle lamps, which does not include the lamps on display by the Lindsay, Welsbach, and General Gas Light Companies, the generosity and "gas man's spirit" of this donation to the welfare of the industry may be appreciated. The generous spirit of the exhibitors has been reflected in the attitude of the Committee in their efforts to advance gas. The consumption of gas is about 20,000 cubic feet a day; and to encourage its use, the Committee decided to give free gas to exhibitors.

Everything modern and worth considering in the way of gas cooking and heating appliances is exhibited by the various manufacturers. These appliance exhibits occupy 2200 square feet of floor space, filled with the latest and most attractive gas-stoves. Demonstrators are in attendance; and there are special cooking lectures covering the entire field of the culinary art. To avoid the placing of gas-meters in each space, the gas is measured by two big meters, forming a most important exhibit in themselves. There are also the latest improvements in gas laboratory apparatus, including photometers, calorimeters, and the different standards used in photometry.

The cheapness of gas is nicely demonstrated by a stand of twenty gas-burners, each consuming 5 cubic feet of gas an hour, connected to a penny prepayment meter so arranged that, by dropping a cent into the meter, the twenty gas-lights are turned on, and invariably with the result that one is impressed by the large amount of light obtainable for the small amount of 1 cent.

The broad-mindedness of the exhibitors is shown by the exhibits of coal, coke, and the different bye-products, as well as retorts for making coal gas, models of benches, and coke-ovens. The classification covering gas exhibits is the first in the history of expositions that has permitted the entering for awards of the material from which gas is made and of the gas itself. This has greatly added to the interest of the Collective Gas Exhibit in many ways. The Consolidation Coal Company, of Baltimore, show a block of gas and coking coal, 30 inches square and over 5 feet in height, weighing about 1500 lbs. Different grades of coke are also on exhibit. Coke-ovens and their products are exhibited by the Semet-Solvay Company, of Syracuse. In the centre of the exhibit is a large plate-glass cube representing 31 cubic feet of available gas remaining from the coking of 10 lbs. of coal; and within this crystal cube there is another cube of coal weighing 10 lbs., and placed around this coal are 7·38 lbs. of coke and the exact quantities of the ammonium sulphate, tar, and benzol produced from 10 lbs. of coal. This is an ocular demonstration which amounts in the ordinary mind to a revelation of the valuable materials obtained from the distillation of coal. The H. Koppers Company, of Pittsburgh, have an attractive exhibit, including a model of their latest coke-oven with the plans and photographs of coal plants and installations of Koppers ovens with the recovery of bye-products. Interesting features of the exhibit are two glass cases, one containing exactly a ton of coal, and the other the amount of coke yielded by a ton of coal, which is approximately 1500 lbs. This exhibit also contains nicely displayed samples of bye-products obtainable from a ton of coal; and on a table is a small gas-lamp so adjusted that the gas from a ton of coal will operate it continuously for 2000 hours.

After describing other exhibits in detail, Mr. Jones concludes by remarking that one of the most important and best deserved victories for gas at the Exposition was the installation of nearly 300 high-pressure gas-lamps of approximately 1100-candle power each, placed on ornamental posts along some of the principal avenues of the Exposition and throughout the States and Nations Sections of the grounds. These high-pressure lamps have also been placed on the top of kiosks in the grounds, thus mixing gas and electric lighting throughout the grounds without detriment to gas.

The Zone, which is the playground of the Exposition, is lighted by gas arcs concealed in ornamental lanterns suspended in groups of two on special standards, and extending the entire length on both sides of the Zone. These lights were furnished by the General Gas Light Company; and they hold their own against the most brilliant electric installations. Everywhere throughout the exposition gas is used for cooking, water heating, and warming the air of rooms.

* The remarks here reproduced supplement in some respects the account of the gas lighting of the Exposition, by Mr. C. B. Babcock, which appeared a fortnight ago, p. 287.—Ed. J.G.L.

A FLICKER PHOTOMETER ATTACHMENT FOR THE LUMMER-BRODHUN CONTRAST PHOTOMETER.*

By E. F. Kingsbury, of the Physical Laboratory, United Gas Improvement Company, Philadelphia.

Equality-of-brightness photometers and flicker photometers have heretofore been built entirely separately from one another. In the literature of the measurement of light, the design and use of the one has been a distinct problem from the design and use of the other, though the results the former gives are often used as a criterion for the practicability of the latter. Consequently, in constructing a flicker photometer, it has been built from the beginning just for the one purpose—notwithstanding the fact that about half of a flicker photometer is identical with an equality-of-brightness photometer in its essential requirements. It should be possible, by interchanging the two dissimilar parts on the part common to both, to make either one easily converted into the other type of photometer. The result should be a photometer that is simple, compact, and capable of measuring either lights of one colour or lights of widely different colours with the best precision of the equality-of-brightness method in the one case and of the flicker method in the other. At the same time it is felt such an instrument should embody the latest approved features that are coming to be recognized as desirable in a flicker photometer.

It is the purpose of this paper to describe such an instrument which the author has devised in the shape of a flicker attachment to replace the telescope of the ordinary Lummer-Brodhun contrast photometer when it is desired to measure different coloured lights. The high precision and the wide distribution of this type of equality-of-brightness photometer justify its selection for this purpose, although there are other good instruments to which this idea could be even more easily applied with a slight modification of details.

The various details concerning this attachment will be better appreciated if, before describing it in detail, we briefly review the essential requirements of a flicker photometer. Wilde says the desiderata for an ideal photometer are:

1. It must be sensitive and certain on lights of different colour.
2. Rays must fall upon the illuminated surface perpendicularly to reduce angle errors.
3. Illuminated surfaces should be directly over the pointer on the bar.
4. When balance is nearly obtained, it should be easy to perceive which way the head must be moved to improve the balance, without the necessity of rocking it to-and-fro.
5. If complete reversibility is required, both illuminated surfaces should be identical, and must be the same distance from the eye.
6. In a flicker photometer, in order to secure sensitiveness, the transition from one surface to the other must be sudden, and there must be no dark line crossing the field of view, such as an unilluminated edge of a card.

These requirements are subject to considerable modification and addition. They are given, however, as illustrating a certain viewpoint in the construction and use of flicker photometers, and to emphasize the need of proper photometric procedure.

The use of the substitution method of photometry is strongly recommended with the direct measurement of distances wherever necessary. This makes the second, third, and fifth requirements unnecessary.

The fourth requirement is misleading, because one cannot obtain a satisfactory balance with the flicker photometer by merely looking at it in one position. The proper method of obtaining a setting is rapidly to vary the light intensity back and forth over the no-flicker peak, at the same time gradually narrowing the range until the point of minimum or no-flicker is found. The essential requirements only will be outlined below. They will not be discussed in detail, as they have been covered elsewhere.

The sensitiveness or precision requirements of a flicker photometer depend fundamentally upon one thing—the focussing of the observer's maximum attention upon the elimination of intensity flicker. The attention is secured in a rather negative way by eliminating all external factors that can divert it.

(1) Undue tiring of the eyes should be guarded against. This is secured mainly by making the field surrounding the flickering field light instead of leaving it dark. The intensity of this illumination should be equal to, or less than, the intensity of the comparison field. If brighter, it attracts the attention. The intensity and colour of this field do not seem to influence the accuracy—at least, within wide limits. This field should be illuminated uniformly and should be free from mechanical defects.

(2) There should be no mechanical flicker in the comparison field itself. This is secured by keeping the optical system clean, and making its focus in space and not on a surface. The focus of the eye-piece lens, of course, should be on the plane of the opening through the external field just referred to.

(3) In securing a balance, the colour flicker (as distinguished from the intensity flicker) should be reduced to a minimum by a proper regulation of the speed of alternation of the colours.

The requirements that make for agreement with the equality-of-brightness method are in each method: (1) A restricted field; (2) a high illumination on this field.

Dr. H. E. Ives has found that on a field size of about 2°, and at an illumination of about 25-metre candles, the flicker method and the equality-of-brightness method agree in their results, provided the same conditions are complied with in each case. A restricted field and a high illumination are somewhat interchangeable. But the candle power of many standard lamps and other light sources places a limit on the illumination; so that the field is restricted to make it equivalent to a higher illumination.

The requirements having to do with procedure have been mentioned—namely, that the substitution method be used with the direct measurement of distances. Where this cannot be done, care must be taken to reverse the comparison head, and also the lamps under test, unless complete reversibility of each has been shown to yield identical results.

The method of securing a balance with the flicker photometer mentioned above should be emphasized here. The relative intensities of the two lights under test should be capable of being easily and quickly varied over a considerable range. One method of doing this is shown.

In making a setting the light should be varied back and forth over the region of minimum or no-flicker, and the limits gradually narrowed-down to a balance. It is impossible to obtain good precision or accuracy by leaving the setting at any one point and trying to decide whether it is the correct point. There is no criterion for the judgment unless the intensity is changed.

The last general requirement is one of convenience. The parts should be easily accessible for cleaning, repairing, and demonstration.

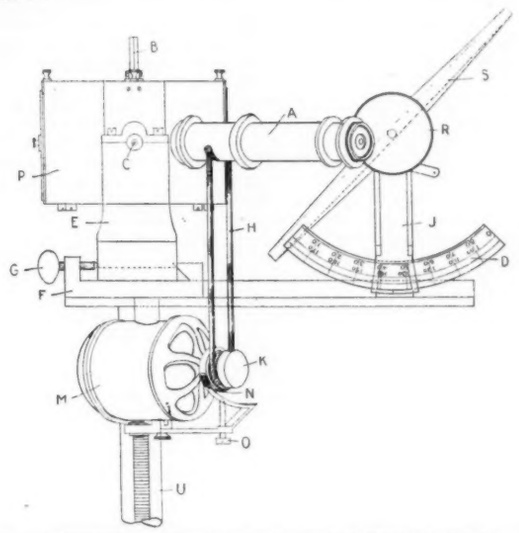


Fig. 1.—Elevation of Lummer-Brodhun with Flicker Attachment, Motor and Neutral Tint-Absorbing Screen, showing the Method of Clamping it to the Head.

A. Flicker attachment. B. Comparison disc. C. Axis of head. D. Scale. E. Casting supporting head. F. Clamp. G. Clamp screws. H. Belt. J. Index. K. Pulley. M. Motor. N. Friction brake. O. Brake screw. P. Lummer-Brodhun box. R. Screen knob U. Support.

The attachment with the motor and a neutral tint-absorbing screen is shown in position on a Lummer-Brodhun head in fig. 1. The attachment A screws into the head in place of the regular telescope. The only other change necessary in the Lummer-Brodhun is the removal of the contrast glasses, which the heads are built to permit readily. A belt H runs from the rotator within the tube to the motor M, which is attached to a clamp F that fastens to the horizontal casting beneath the box. The belt H is made of spirally-wound steel wire. It acts as a spring to take up any slack, and allows of the belt being easily slipped off the motor pulley. The part shown to the right is an addition, proposed by Dr. Ives, so as to facilitate reading, in the shape of a neutral tint-absorbing screen formed of parallel wires in the frame S. The frame is turned by the knob R and the transmission read on the scale D. This screen permits the light intensity to be easily and quickly varied over a considerable range, the desirability of which was mentioned above. In most cases it is more convenient to use such a screen than to move the light or the photometer head, though originally the attachment was intended to be employed as the Lummer-Brodhun contrast head would otherwise be. Dr. Hugo Kruss has a screen attached to his contrast photometer that would likewise undoubtedly work nicely with the flicker attachment, if the micrometer thread is not too fine. O on the motor is a friction brake designed to allow the speed to be changed quickly and easily over a wide range.

The attachment is shown internally in elevation in fig. 2. The right-hand end of the tube screws into the Lummer-Brodhun, and

* Communicated by the author to the "Journal of the Franklin Institute."

when the tube is in position, with the belt D downward to the motor, the collar C is screwed tightly against the box. This brings the attachment central and square on the head, and at the same time renders it rigid. A is a lens setting in a collar B that magnifies the Lummer-Brodhun field properly. E is a prism that sets in a cylindrical piece G; the whole being rotated in bearing H by the belt. The bearing is held in position by a screw beneath the tube. Upon loosening this screw the bearing with the rotating piece containing the prism can be slipped out of the tube either way if the belt is first unhooked and pulled out. K is the eye-piece, which consists of a brass tube covered at the far end with a disc J, in the centre of which is the hole making the 2° field mentioned above. The eye-lens is at P, set in a collar Q.

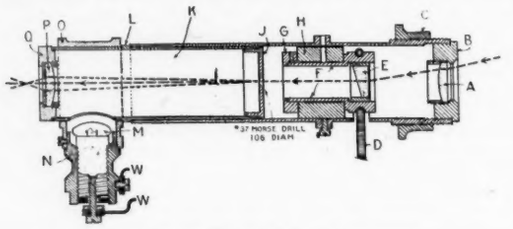


Fig. 2.—Elevation of Flicker Attachment.

A. Front lens. B. Collar for lens. C. Collar to hold telescope rigid in head. D. Belt. E. Rotating prism. F. Rotator bearing. H. Stationary bearing for rotator. J. Front of eye-piece. K. Eye-piece. L. Collar on eye-piece. N. Lamp socket. O. Rotating collar for lamp. P. Eye-lens. Q. Collar for lens. W. Wires to lamp.

The entire interior of this eye-piece K is painted white; and at M is placed a small 2-volt pocket torch-light, which, when lighted, sends its rays up in the eye-piece. This, in turn, being a matt-white, acts as an integrating sphere, and diffuses the light so well that in looking into the eye-piece through the lens one sees surrounding the 2° opening a uniformly illuminated surface. To allow the adjustment of the brightness of this surface to suit the observer, the socket N, into which the light sets, is fastened to a collar O, which turns on the eye-piece and moves the lamp over the solid part of the eye-piece—the whole arrangement acting as a shutter. It allows of the illumination being changed from too bright to absolute darkness, and at the same time always keeping it uniform. A spring in the collar pressing on the eye-piece insures the collar always turning smoothly. This collar can be slipped off the head of the eye-piece. The lamp socket can be slipped out of the collar on loosening a set-screw to allow the replacement of the lamp. L is a small collar fastened to the eye-piece that limits the distance which it can be slipped into the attachment tube, and at the same time the turning collar bears against it on the opposite side. When it is desired to remove the eye-piece, it is simply pulled out of the other tube, bringing J with it. The white surface is thus never exposed to careless handling. Fixed resistances (not shown) go in series with lamp and motor. Both are intended to operate on a 110-volt line to the head.

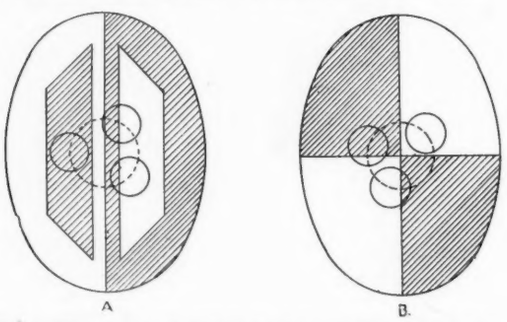


Fig. 3.—Diagrams to show how the Lummer-Brodhun Field (A) is cut by the Attachment; Also a Four-Part Field (B).

The method of cutting the Lummer-Brodhun field is indicated in fig. 3 (A). The dotted line shows how it goes from trapezoid to trapezoid; the circles representing three different positions of the rotating prism. B shows the four-part field used in the laboratory flicker photometer recently built in this laboratory. This four-part cube can be easily put in a Lummer-Brodhun box to replace the present one, if this type of field is preferred with the attachment. A question to be answered by the construction of this instrument was whether the regular type of alternation given by the Lummer-Brodhun field would result in less precision or accuracy than the four-part field. No difference was found on trial, the irregular alternation of fields apparently calling merely for a lower speed.

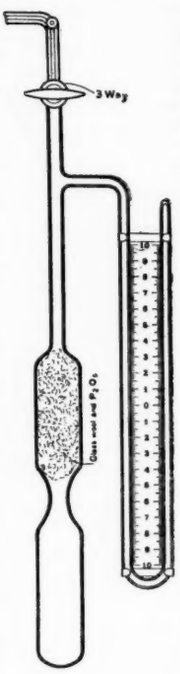
The real value of such an instrument as described is best shown in actually measuring large colour differences. A deep red monochromatic signal glass whose transmission was accurately known was measured against a 1·15 W.P.C. tungsten light on the other side; likewise a green signal glass and a 4 W.P.C. carbon lamp against the tungsten. In each case it has been found equal in precision and accuracy to the large laboratory instrument just referred to. The focus of the optical system of the attachment is in space and not on a surface; and, although the attachment was tested on a photometer head whose mirrors were badly corroded and needed replacing, no trouble was experienced from mechanical flicker.

It should be made plain that this attachment does not obviate the necessity of a proper selection of observers if the result is to represent that of an average eye. At least five observers should be used in this case, as has been carefully explained in a paper recently published concerning this point. This is required of all flicker photometers. In addition, care should be taken to remove the contrast glasses of the Lummer-Brodhun in using the attachment. If this is not done, there will always be an outstanding intensity flicker. This point has been mentioned previously, but is repeated here for emphasis.

DETERMINATION OF BENZOL IN GAS MIXTURES.

The Laboratory of Gas Investigations, Bureau of Mines, Pittsburgh, U.S.A., recently issued particulars of a scheme of analysis—by Messrs. G. A. Burrell and I. W. Robertson—carried out to determine the quantity of benzol in gas mixtures; and Dr. G. A. Hulett, the Consulting Chemist to the Bureau, has consented to the publication of the result in the "Journal of Industrial and Engineering Chemistry."

The investigators write: With the present great demand for benzol, and the installation of plants at different places for obtaining this constituent, there has arisen a demand for a rapid method of determining the benzol content of gas mixtures. Hence a scheme follows which the authors have used in determining it in the carburetted mixed coal and water gas of Pittsburgh.



An illustration is given of the apparatus. The bulb contains phosphorous pentoxide for removing water vapour. To start a determination, the apparatus is connected to a vacuum pump and exhausted of its air—a Gerky pump will do. The gas mixture is then introduced at atmospheric pressure; the barometer read; and the two bulbs immersed in a mixture* of solid carbon dioxide and acetone or alcohol. After waiting about ten minutes, as much gas as possible is withdrawn from the bulbs by means of the vacuum pump. The gases removed will be those of high vapour pressure at − 78° C. In the case of the mixed coal and water gas the authors worked with, they are CO_2, O_2, CO, H_2, CH_4, N_2, C_2H_4, C_2H_6, C_3H_6, C_3H_8, and C_4H_8; in fact, practically all the gases except the benzol. Next the stopcock on the apparatus is closed; the cooling mixture removed; and the benzol allowed to vaporize at room temperature. Its pressure is then read on the side-arm mercury manometer attached to the apparatus. This pressure compared with the atmospheric pressure gives the percentage of benzol in the gas mixture. The results of two determinations are shown in Table I.

TABLE I.—*Benzol Determination in Pittsburgh Gas.*

Sample No.	1	
Original pressure of gas . . .	744 mm.	744 mm.
Partial pressure of benzol vapour	10 mm.	9 mm.
Percentage of benzol	$\frac{10 \times 100}{744} = 1{\cdot}34$	$\frac{9 \times 100}{744} = 1{\cdot}31$

To obtain other data on this method of separation, the distillate from the above freezing process was next passed into fuming sulphuric acid. In the case of sample No. 1, there was obtained 7·32 per cent. of illuminants; and in the case of sample No. 2, 7·39 per cent. The total illuminants in the Pittsburgh gas, as found by absorption in fuming sulphuric acid, is 8·67 per cent. In other words, the benzol percentages, as found, when added to 7·32 and 7·39 respectively, will equal 8·66 and 8·70 per cent., or almost identically the same quantities as the total illuminants in the coal gas.

Benzene reacts with oxygen as follows:

$$C_6H_6 + 7{\cdot}5\ O_2 = 6CO_2 + 3\ H_2O.$$

The contraction is 2·5 volumes, and the carbon dioxide is 6 volumes.

Table II. shows the results of analysis of the residual vapour that was held in the liquefaction bulb shown, when the coal gas was cooled at a temperature of − 78° C. Before analysis the benzol was diluted with air.

It will be observed that the ratio of the carbon dioxide to the contraction is almost exactly 6 : 2·5—showing that the vapour obtained in the benzol determination was principally benzol.

* This mixture gives a temperature of about − 78° C. The solid carbon dioxide, obtained by releasing the gas from a commercial cylinder, through a cloth towel, is mixed with acetone or alcohol to the consistency of slush.

TABLE II.—*Analysis of Benzol Vapours.*

	Cc.
Volume taken for analysis	28·29
Oxygen added	51·94
Total volume	80·23
Volume after burning	75·47
Contraction due to burning	4·76
Volume after KOH absorption	64·25
Carbon dioxide produced by burning	11·42

Traces of other easily condensable vapours may have been present, but apparently in such small quantities as to be negligible.

The authors were unable to find, in the literature, the vapour pressure of benzol at — 78° C., but apparently it is very small. Benzol boils at 80·12° C.; at — 20° the vapour pressure is 5·76 mm. The authors prepared saturated vapours of benzol by shaking the pure liquid with air. It was a simple matter to prepare unsaturated vapour by merely diluting the saturated vapour with air. The percentage of benzol was checked by combustion analysis. It was found that all of the benzol could be separated at — 78° C. The above tests show that, as far as the Pittsburgh gas is concerned, the method is satisfactory.

In extracting benzol from coke-oven gases [large-scale operations for this purpose are in progress], the gas is washed with a petroleum distillate, in which the benzol is dissolved, also toluol and other products. As a check on the efficiency of the scrubbing apparatus, there is needed a rapid test for the benzol, &c. In this case, toluol or other easily condensable hydrocarbons would interfere with the test, as the vapour pressure of toluol is only 0·0058 mm. at — 78° C. The best one could do would be to estimate them together, along with any other vapours that might also be retained, so that the test would give the efficiency of absorption of all the easily condensable vapours in the scrubbing oil. No experiments have been made with coke-oven gas.

COAL-TAR PRODUCTS USED IN MAKING EXPLOSIVES.

The current issue of the "Engineering Review" gives an abstract from one of the recent "Technical Papers" of the Department of the Interior, Bureau of Mines, United States of America, dealing with the subject named above. It is by Mr. C. G. Storm.

Mononitrobenzene, often known as "oil of mirbane," is little used in the explosives industry because of its volatility, although it is sometimes used as a minor constituent of certain low-freezing dynamites and other types of explosives. It is used much more extensively in soaps, lubricating greases, &c., mainly for the purpose of imparting a more or less agreeable odour. Furthermore, it forms an intermediate product in the preparation of aniline and its many derivatives.

Among the aniline derivatives of importance are tetranitroaniline and tetranitromethylaniline, both of which have in the past few years assumed prominence as detonating explosives for projectiles, mines, and torpedoes. Many other derivatives of aniline have been found to be applicable as stabilizers or as gelatinizing agents in nitrocellulose smokeless powders. Among such substances are methyl or ethyl phenyl urea, phenyl benzyl ether, phenylacetanilide, formanilide, and diphenylamine. The latter is, however, the only one which has been used in this country.

The nitrotoluenes are more extensively used in the explosives industry than any other nitro-substitution compounds—being employed chiefly for sensitizing certain types of ammonium-nitrate explosives and for lowering the freezing point of the low-freezing dynamites. In the absence of exact statistics, a rough estimate places the amount of the various grades of nitrotoluenes used in the low-freezing dynamites manufactured in this country in 1913 at about 2,000,000 lbs., while in the "permissible" explosives employed in coal mining probably 250,000 lbs. of the same materials were used during the same year.

Pure crystalline trinitrotoluene has proved one of the most efficient explosives for use in explosive shells, torpedoes, and mines, and is extensively used by almost every important military service, including that of this country. In recent years it has also come into use as a substitute for a large proportion of the mercury fulminate employed in detonators (blasting caps), and as a charge for detonating fuses.

The nitronaphthalenes are used to some extent, chiefly as sensitizers, in the "short-flame" permissible explosives of the ammonium-nitrate type. Certain derivatives of these compounds—the alkaline salts of nitronaphthalene sulphonic acids—produce, when mixed with sodium nitrate and other ingredients, explosives suitable for coal mining. Picric acid (trinitophenol) and certain of the picrates are highly important as military shell explosives; the acid is also employed in surgical dressings for burns and wounds. The manufacture of these compounds depends entirely on phenol (carbolic acid) as a raw material.

The possibilities of the use of the nitro derivatives of coal-tar products in explosives are far greater than is indicated by the above brief summary. Much investigation work on such compounds is being carried on in this country as well as abroad, from which important developments in the explosives art may result. The Bureau of Mines has instituted a systematic research into the preparations and properties of these nitro-substitution compounds with a view to studying their possibilities in the explosives industry.

LACLEDE GAS COMPANY'S NEW PLANT.

A Coking Oven and Bye-Products Installation.

Some weeks ago, there was put into operation by the Laclede (St. Louis) Gas Company a new gas and bye-products plant, which has been under construction for twelve months past, and has involved an outlay of $2,000,000. Under the President (Mr. C. L. Holman), the construction of the new plant was planned by Mr. George B. Evans (Chief Engineer) and Mr. T. H. Turner (Constructional Engineer). An illustrated description of the work done appeared in the "Gas Record."

The new plant is located at Carondolet, on a site of 180 acres, at the junction of the Rivers Mississippi and Des Peres. For the present, the railway facilities will be used exclusively, though everything has been arranged so as to easily utilize the abundant facilities for water carriage. The buildings are of concrete, steel, and brick, with the exception of the breaker building, the two screening plants, and the belt galleries, which are encased in galvanized corrugated steel. One of the principal features of the work is a plant for recovering benzol. This has cost $75,000; and it has been planned for an annual capacity of 300,000 gallons of benzol. The coal-handling plant is of a complete character, and includes a 1000-ton hopper to which the mixed and broken coal is elevated, and a 110 feet radius crane operating on a circular track, which will stack coal to a height of 40 feet, and take it out of store again as needed.

THE KOPPERS OVENS.

The ovens proper consist of one battery of 56 combination regenerative Koppers ovens, having a capacity of 13½ tons each, and designed for a coking time of 18 hours. Each oven is 37 feet long by 10 feet high, having a width of 18½ inches on the pusher side and 21 inches on the coke side. The construction of the regenerators, combustion nozzles, and oven-wall flues is such that an even heat may be maintained around the ovens, producing a good uniform grade of coke and gas. A reversing mechanism, actuated electrically and controlled by a time clock, changes the draft outlet and the gas and air inlets from one side of the battery to the other every half hour, thereby causing the products of combustion to heat the regenerators which were cooled during the previous half hour by the entering air used for combustion, so aiding very materially the fuel economy. A self-supporting brick-lined steel stack, 10 feet in diameter and 200 feet high, provides ample draught for the oven battery.

The combination feature of the ovens provides for the use of producer gas from separately-fired gas-producers. In anticipation of the use of producer gas for heating the ovens, each regenerator was divided by a fire-brick partition wall so that both the producer gas and air may be separately preheated before burning in the oven-flues above the combustion nozzles. In changing to the use of producer gas as fuel, it will be only necessary to remove a fire-clay plug from each of the two air-nozzles at the bottom of each oven-flue, and to connect-up every other air-inlet with the producer-gas main in such a manner that the flow of gas will be controlled by the reversing mechanism. The removal of the fire-clay plugs from the air-nozzles at the bottom of each oven-flue will so enlarge the holes that one may be used for admitting air and the other producer gas.

Gas from the ovens is conveyed by ascension-pipes to either of two parallel collecting-mains, just above the pusher-side of the ovens—one provided for the rich gas made during the first hours of coking, and the other for the poor gas made during the later hours. Electrically-operated governors maintain a constant pressure on the collecting-mains by opening or closing a butterfly valve, which allows the gas to escape to a lower pressure—maintained in the foul mains by exhausters in the bye-product building. In charging an oven, the collecting mains are dampered, the ascension-pipe capped, and the coaling doors on top of the oven opened. Electrically-operated door machine cars on either side remove the doors; a coke-guide car is placed in position on the coke side for guiding the coke into a quenching car, which is cast-iron lined, has a sloping bottom, and is provided with dumping doors operated with compressed air. A signal from the whistle of a steam locomotive coupled to the quenching car starts the ram of the pusher machine on the other side of the oven; and the coke is pushed out of the ovens through the coke-guide car and on to the quencher car, and the ram then withdrawn. The doors are again placed in position, luted, and the oven charged from above with a weighed amount of coal from the storage bin. In the meantime, the hot coke is removed to the quencher station, where it is heavily sprayed from an overhead tank for a specified number of seconds, and the water given time to drain off. The car is then brought alongside a cast-iron wharf, where the coke is deposited, and any local hot spots sprayed individually with a small hose.

COKE-HANDLING SYSTEM.

After cooling and drying on the coke-wharf, the coke is allowed to slide through a sectional hand-operated gate on to a rotating vane feeder dropping on to one of the series of coke-conveyor belts, which convey it up into the metallurgical screening station. Here it may be dropped into cars, screened for either foundry or furnace use, or crushed and sent to the domestic screening station. For foundry use, it is passed by a picking station and then over a revolving screen and loaded in cars. For furnace use, the coke is passed over a bar screen spaced considerably closer than the parts

of the rotating screen, and elevated by belt into open cars. The finer coke from the metallurgical screens, together with the breeze, is then carried to the domestic screening station, where it is separated into various sizes by means of rotating and shaker screens, and is then dropped into bins ready for loading. A belt and bucket elevator lift any small coke and breeze made while loading from the ground level to the upper floor, where it is again fed to the screening apparatus. Three box car-loaders running upon tracks adjacent to the two screening stations alluded to complete the equipment.

In storing coke, the entire charge is diverted into open cars, and then transferred to a large coke-pit. The 110-feet radius crane already referred to removes the coke from the pit to the storage heap and reclaims it, loading it in hopper-cars, from which it is taken by belt-conveyors to the screening plants to be screened for shipment.

The Bye-Product Building.

Separate rich and poor foul-gas mains conduct the gas from the collecting mains to the condensers and exhausters. The exhausters, besides maintaining an even pressure on the foul-gas main, force the gas through tar-extractors, ammonia washers, benzol washers, purifiers, station-meters, and then into a 1 million cubic feet holder.

In the four water-cooled condensers, temperature regulators, which may be set for any desired regulation, control the water-supply valves, by means of compressed air admitted through a pilot-valve actuated by a thermostat. Recording thermometers give a complete record of the temperatures maintained for each period of 24 hours.

The exhausters are of the positive rotary type, driven by simple condensing engines, which exhaust steam at 15 lbs. pressure for use in the ammonia concentrators.

For removing tar from the gas three extractors were installed, which are a modification of the "P. & A." design. A large spider-frame closed at the top, and having six sets of perforated vertical plates forming the sides, is suspended in a totally enclosed high cylindrical steel tank. Five drain-pipes for the tar are provided at different levels on the outer shell, so that the tar may be kept at different heights, and the spider plates on the inside sealed accordingly. For finer adjustment, the spider, carrying the perforated plates, may be raised or lowered by an outside screw acting through a fulcrum, on a rod passing through a stuffing-box to the inside, to which the spider is attached. Gas is admitted to the extractor at the bottom, and is conducted in a vertical pipe brought up above the tar-level, and made to impinge upon the perforated plates (at any velocity desired) by adjusting the area of perforations exposed above the tar-level.

Three ammonia scrubbers of the bell type are in use, each composed of twenty cast-iron sections, built up one above the other, eighteen of which are active. Each section is divided, with respect to the washing liquid, into six long compartments having two bells and an overflow; the overflow on alternate corresponding compartments being placed at opposite ends, and at such a height that the high point of the serrations on the bottom of the bells is immersed half-an-inch in water when sealed and ready for use. A large overhead tank in two compartments provides for the use of either fresh or very weak ammoniacal liquor for scrubbing at a constant head; and the compartments of the top section are provided with individual sight-feed glasses for aid in adjusting the water supply, which flows from the top down. Gas enters the bottom of the scrubber, and is made to bubble upward through the seals. The ammonia in the gas is gradually but fully absorbed by the descending water, which increases in ammonia strength on its way down, and drains away at the bottom through a seal to a small reservoir. The advantages of scrubbers of this type are that there are no moving mechanical parts, the scrubbers are easily cleaned and inspected, and the wear and tear is practically *nil*, as the parts are all cast iron and only subjected to weak ammonia water.

A tar and ammonia pump-room for flushing the collecting and foul mains and for handling and loading all tar and ammonia, also forms a part of the bye-product building. All tar and ammoniacal liquor removed from the gas flows to one of two small reservoirs, from which it is pumped to a large separating tank. After the tar and liquor separate, they flow by gravity into different large storage tanks provided for the purpose.

Ammonia Concentrators.

Weak liquor collected in the storage tanks is concentrated by two large ammonia stills, each capable of concentrating in 24 hours 60,000 gallons of weak liquor from a strength of about 1 per cent. ammonia up to 17 to 20 per cent. The stills, apart from the usual free and fixed ammonia stills, lime legs, and coolers, are provided with suitable superheaters, sulphuretted hydrogen and carbonic acid separators, dephlegmators, vapour condensers, and heat exchangers, all aiding towards most economical concentration. Exhaust steam from the exhauster engines, together with whatever live steam may be necessary, are used in heating the stills, and regulated in amount by temperature regulators. Fixed ammonium compounds are broken up with milk of lime furnished to the lime leg by a mixer, centrifugal pump, and constant head tank. Weak liquor to the stills is fed from an overflow tank through a meter to the sulphuretted hydrogen and carbonic acid separators, then in turn to the heat exchanger, superheater, free ammonia still, lime leg, and fixed still. The ammonia vapours from the still pass through the dephlegmator, cooler, and vapour condenser, and drain by gravity to storage tanks outside the building, from which it may be loaded into cars by compressed air. An auxiliary plant for the extraction of benzol is now in process of erection, and shortly will be placed in operation.

Other Plant.

Sulphur in the form of hydrogen sulphide in the gas is removed in two sets of open air oxide steel purifiers, each set composed of four boxes having a layer of 5 feet of material. The boxes are piped so as to permit their use in different consecutive series, but are not designed for reversal of flow.

In the pumping-station are three wet station-meters, for measuring the gas just before entering the holder. There also are installed two positive blowers, direct connected to steam-engines, used in pumping the gas from the station to the high-pressure system. The exhaust steam from the engines will be used for heating the holder during the winter months.

The holder, which has three lifts and a total capacity of one million cubic feet, is entirely of steel, with the tank above ground. Three gas connections are provided. All gas made is admitted to the holder through one connection; the second is used for high-pressure pumping; the third is provided for low-pressure distribution, so that no pulsation from the high-pressure blowers will affect the low-pressure system.

Steam and electricity for operating and lighting the plant are generated in a large and substantial structure built without a basement, and containing up-to-date and economical plant. A convenient machine-shop and office buildings complete the new works.

"B.TH.U." LOSSES ON COMPRESSION.

American Experiences.

At the last meeting of the New England Association of Gas Engineers, Mr. Willard O. Brewer, the Chemist of the Meriden Gaslight Company, of Connecticut, contributed a paper entitled "British Thermal Heat Losses with Medium Pressures;" and the text of it has been appearing in the pages of our New York contemporaries, together with some of the discussions to which the reading of it gave rise.

Mr. Brewer said: An increasing demand for a heat standard in place of, or in addition to, the present light standard, has led to much investigation to determine the advisability of such a change. On the part of the consumer, the question is whether as good service will be obtained, and whether it will eventually result in lower prices; while the manufacturer desires to learn the relative difficulties, and the cost of manufacture and distribution, under the two standards. The Meriden Gaslight Company have maintained a calorimeter in the laboratory for the past two years, and heating values of the carburetted water gas and mixed gas have been determined daily at least, as well as the candle power. In the manufacture, apparently no more difficulty need be met with in the use of a heat standard than in the use of a light standard; while as to the effect of distribution on the heating value of our gas, no data had been obtained.

In order to learn the loss due to compression and transmission, the gas which underwent the most severe conditions was taken. A medium pressure 6-inch line supplies the village of Southington, eight miles from Meriden; and branching from this is a 6-inch line which supplies Cheshire. During November last, at the time of the tests, the consumption of the district was between 55,000 and 65,000 cubic feet daily. The gas was subjected to a pressure of from 7 to 100 inches water, depending on the consumption. The line to Southington crosses five short bridges, but is well protected from low temperatures. A calorimetric testing-station was located at the gas office in Southington; and in Meriden the testing was done in the laboratory at the works, about 10 feet from the holder from which the gas was drawn to send over the line.

The outline of tests included at Meriden a determination of candle power, B.Th.U., dew-point, benzol, and illuminants, and at Southington a B.Th.U., dew-point, and the collection of samples of gas for analysis at Meriden. The chief difficulty was the obtaining of the same sample of gas at both places. Estimation of the contents of the mains gave 20,000 cubic feet, outside of the services. The fact that the main was in the form of a T, and that there was no way to tell how much each branch consumed, made exact calculation impossible. Finally, the figure of 17,000 to 20,000 cubic feet was taken to be the amount to be passed through the meter from the time of the test at Meriden to the time of the test at Southington. Thus, tests made in Southington in the middle of the afternoon were on, approximately, the same gas as was tested during the last part of the morning at Meriden. Because of the uncertainty as to whether the samples were of the same gas, the daily results are not strictly comparable; and the average of several tests, covering as many days' seems best to show the actual conditions. Not only so, but the gas was subjected to the greatest pressure of the day—due to the greatest consumption then and the necessary speeding-up of the exhauster.

The following are the results obtained:

Effect of Pressure on Heat Value.

Meriden. Dew Point Deg. Fahr.	Candle Power.	B.Th.U.	Inches Water Pressure at Exhaust Outlet.	Southington. Dew Point Deg. Fahr.	B.Th.U.	Inches Water Pressure.	
53	17·70	588·3	100	50	589·3	45	
54	17·40	602·0	100	49	594·3	45	
54	17·94	601·8	84	50	606·9	45	
54	17·88	621·5	84	48	608·3	50	
56	17·91	617·5	84	53	608 7	50	
57	18·52	618·2	84	50	614·4	50	
52	17·87	615·5	84	52	613·8	50	
55	18·28	610·2	84	51	604·7	50	
52	18·24	616·5	84	47	619·1	50	
55	17·20	614·4	62	52	613·3	35	
55	16·84	601·5	62	50	598·0	40	
48	17·52	611·2	60	46	620·1	40	
50	16·56	597·8	62	44	597·6	45	
52	17·30	603 1	60	46	596·4	35	
50	17·14	600·6	60	47	596·8	45	
48	17·34	612·9	60	41	600·6	45	
52·8	17·60	608 3		48·5	605·1	Average.	

Analysis of Gas Samples for Illuminants.

Meriden. Per Cent. Benzol.	Per Cent. Illuminants.	Southington. Per Cent. Benzol.	Per Cent. Illuminants.	
1·10	5·65	1·00	6·05	
1·20	7·75	0·65	7·70	
1·55	7·80	1·00	7·70	
1·15	7·65	0·75	6·75	
1·30	8·05	1·00	8·20	
1·30	7·65	1·00	7·25	
1·25	7·50	1·10	7·30	
1·25	7·75	1·20	8·40	
1·25	6·10	1·20	6·50	
1 30	7·40	1·25	6·45	
1 55	7·75	1·05	7·35	
1·29	7·37	1·02	7·24	Average.

Gas analyses were not obtained every day. They are placed separately, because it was deemed they were not necessarily on the same gas as the other tests, but indicated, nevertheless, a good average of relative changes in benzol and illuminants due to compression and transmission.

Note that the loss in B.Th.U. amounts to 3·2 B.Th.U., or 0·52 per cent.; while the benzol loss is 0·27 per cent., and that of illuminants 0·3 per cent. It is regretted that candle power determinations could not be made at Southington, as undoubtedly the light loss would have been much greater than the heat loss.

The calorimeters used were a Sargent (loaned to us by the New Haven Gaslight Company) and our own—a late type of Hinman-Junkers. Preliminary to the tests the meters, which had been standardized by a one-twelfth cubic foot bottle, were checked against each other and found to indicate the same. Average tests on the same gas showed that the Hinman-Junkers calorimeter gave 0·3 per cent. higher results. The water (which was furnished by overhead tanks, and was at nearly room temperature) was weighed. The calorimeter thermometers were standardized.

Candle powers were read on an 80-inch closed-bar photometer with a two-candle standard, in a Sugg "D" low-cone burner. Comparisons of this burner with a 7-feet Bray's "Special" and a Bray's 8-feet economizer slipped over a 3-feet regulator, on the same grade of gas as used in the tests, showed the 7-feet burner as 1·000, the 8-feet as 1·044, and the Sugg "D" as 1·122—or, for a 17·60-candle power by the Sugg "D," as in the average of the tests, the 8-feet burner would give 16·38-candle power, and the 7-feet 15·69-candle power.

In analyzing the gas, a water-jacketed Hempel burette, connected permanently to the pipettes by a "battery of stop-cocks" (branch tube) was used. The benzol absorption was made over mercury in a single pipette full of rubber tubes stretched over glass rods. After taking out the carbon dioxide and oxygen, the illuminants were absorbed by a saturated solution of bromine water. The Southington samples were taken in regular glass sampling tubes, and transferred to the Hempel apparatus for analysis.

In the course of the discussion as appearing in the "American Gas Light Journal,"

Dr. BEARDSLEY said: The New Haven Gaslight Company have made some similar tests. We have for years supplied gas to an outlying town, distant about ten miles from New Haven. At first gas was delivered to this territory under a distribution pressure of about 3 inches, but in December, 1910, the supply was reinforced by a high-pressure booster line carrying 2 lbs., which feeds into the low-pressure system 4·6 miles from the works. This line passes over several bridges, and is subject to exposure. It was thought desirable to learn what deterioration in candle power and heating value the gas underwent in midwinter, as a result of this travel and exposure. A photometer room was built in the distant town, and fitted with a 100-inch bar and a standard calorimeter outfit. Tests were carried on during the winter of 1909-10, when the gas was supplied under low pressure, and also during the winter of 1910-11, when at least part of it had been subjected to 2 lbs. pressure. Readings were taken in the late afternoon and early evening, when the consumption was greatest. The gas was about 38 per cent. coal gas and 62 per cent. water gas. The tests in New Haven, against which comparison is made, were taken at the main office, almost a mile from the works. Tests taken at the works were higher than those at the city office. The results are given below. Station "A" is the Company's regular testing-station at its main office; Station "B," the temporary testing-station ten miles distant.

1909 1910.

Date.	Ave. Tem.	Sta. A C.P.	Sta B C.P.	Loss C.P.	Sta. A B.Th.U	Sta. B B.Th.U.	Loss B.Th.U.
Jan. 27-Feb. 14	28·5	20·10	16·65	3·45			
Feb. 15-Mar. 16	35·0	19·44	16·23	3·21	641·8	599·5	42·3
Mar. 17-31	46·2	20·34	18 27	2·07	654·7	617·0	37 7
Apr. 1 2	55·0	20·13	19·02	1·11	649·5	630·0	19·5

1910-1911.

Date.	Ave. Tem.	Sta. A C.P.	Sta. B C.P.	Loss C.P.	Sta. A B Th.U.	Sta. B B.Th.U.	Loss B.Th.U.
December	26·4	19·53	17·52	2·01	642·1	612 4	29·7
January	32·1	19·92	17·66	2·26	640·2	617·9	22·3
February	28 2	19·73	17·75	1·98	643·6	613·5	30·1
Mar. 1-16	33·4	19·66	17·32	2·34	639·7	610·0	29·7
Mar. 17-31	38·0	19·86	19·58	0·28	639·5	628·0	11·5
April 7	52·0	20 89	21·52	+0·63	650·0	656·0	+6·0

A few samples were collected at Station "B" in February, 1911, and analyzed. They show a loss of benzol vapour of about 1 per cent., as compared with the gas at Station "A." A sample taken on April 7 showed the same quantity of benzol in the gas at both places. In the latter part of March, the loss of lighting and heating power diminished to zero. After April 1 there is a slight gain, due to the fact that some of the benzol condensed out in the main re-evaporated into the gas with the coming of warmer weather. We found at this works much greater loss than Mr. Brewer found. This is principally due to the fact that our tests were made in mid-winter instead of the fall; and our gas was somewhat richer than Mr. Brewer's. No greater loss was found the second winter, when nearly all the gas supplied had been subjected to 2-lbs. pressure. Comparison of the gas is here made, not against gas at the works, but against that which has already travelled about a mile, through very active trunk mains, and without unusual exposure. We conclude that the effect of long travel, with severe exposure to low temperature, is more serious than that of moderate compression. Theoretical considerations would point in the same direction. If we were dealing with a gas saturated at 50° with the vapour of pure benzol, compression to 2 lbs. would diminish the benzol present by about 12 per cent., while cooling to 32° would diminish it by about 47 per cent. These figures cannot be applied strictly to ordinary conditions, because the so-called benzol vapours in gas are not those of pure benzol. In considering the necessity of delivering gas of a required quality at a distant point during the winter, it would seem of more importance to consider the effect of exposure than of moderate compression.

Mr. SHATTUCK: In conjunction with Mr. Klumpp, we made a number of experiments along this line. The general trend of our results was that the candle power loss would run nearly 30 per cent. from high compression, and the B.Th.U. loss from 3 to 5 per cent., with initials of 30 lbs. to 45 lbs. and final pressures of 20 lbs. to 25 lbs.—showing that we should work for a heat-unit basis when transmitting gas under high pressure.

Mr. HINMAN: The most remarkable result is the very little depreciation the gas suffered in thermal units—only slightly over one-half of 1 per cent. The variation in candle power—almost 2 candles and about 10·6 per cent.—was about twice as great as the loss in heating power. The heating power variations were: 33·2 the highest, 5·3 the percentage. Again, the loss of benzol and illuminants given in percentages of the whole gas would show much better if calculated as percentages of the total amount of benzol and illuminants. Calculated this way, the loss of benzol in going from Meriden to Southington was 21·7 per cent. reckoned on the total amount of benzol in the beginning. The percentage loss in illuminants was much less, 1·71 per cent., which shows considerable loss in the benzol and little in the illuminants. The heating power fell off almost nothing.

Mr. NORCROSS: We are now in negotiation with the Public Utilities Commission with a view to the establishment of rules and regulations for gas service; and some of our friends who are not exclusively devoted to gas, also have electrical rules under consideration. The Commission undertook this work through an expert (Professor Knowlton, of Trinity College), and started nearly a year ago to get ready for this schedule. He has gone into it carefully, and with a fair and open mind. We now have laid before us tentative rules, with a view to provoking our discussion and criticism. We have something which has stamped upon it the intent of fairness and reasonableness; yet when we go into the details we find a great many things we feel would be impracticable. The proposed standard is heating power only, and for 575 B.Th.U. The Commission, in the course of the first meeting for discussion, suggested that they believed they made a mistake in not making it 600 B.Th.U. A Committee was appointed to make it more convenient for the Commission to talk things over, and the experts to confer; but the last thing the Chairman of the Commission said to us before breaking up was: "I want to ask you, gentlemen, particularly to consider my suggestion that this standard be made 600 B.Th.U. instead of 575 B.Th.U." His ground for asking this was that the figures they

had showed that most of the companies had been supplying 600 B.Th.U. or higher, and we have got to persuade him there is some real reason for making it 575 B.Th.U.

Mr. KLUMPP: The subject of heating value is still in its infancy. We studied first the methods of testing for heating value; and I believe we have it standardized and so specified that consistent results may be obtained. But what can be produced and transmitted is a different question. Many have the idea that the heating value of a gas can be given if the candle power is known; but this is not true. The figures presented by the two gentlemen who have spoken on this subject are interesting; but the records of individual tests cannot be used to determine conditions existing at any other plant, unless the conditions were reproduced with a gas having exactly the same characteristics and treated the same way. Illuminating value losses are very irregular, because one has at many times a very unstable or tender gas. Similar conditions exist with heating value, but not to the same extent. If we are to give figures of loss in heating value for a gas distributed at low pressure or high pressure, in cold or warm weather, we must know the quantity of materials used in the manufacture of the gas, the heats carried, and the method of treatment during manufacture. If two water gases are made, one with an efficiency of 5½ candles per gallon, the other with an efficiency of 6½ candles, one must not expect the same losses in transmission. The same may be said of coal gas—large yields per pound and high candle power represent a gas that will not carry so well as that produced with lower yields and lower candle power. The former has a larger percentage of the benzol series that will deposit with high pressure, low temperature, and frictional scrubbing. The quantity of these vapours that a gas will carry is dependent on certain laws of vapour tension. So if you compress a gas to 15 lbs., you are putting 2 cubic feet of gas in the space of 1 cubic foot; and if the gas was previously saturated, you cannot expect to carry more than one-half of the vapours. If you freeze the gas or greatly lower its temperature, you also lower its carrying capacity for these vapours. From the figures given in this paper you will note a loss of only 3 B.Th.U. The calorimeters may vary this much—only one-half of 1 per cent.—so we might say that the heating loss was negligible. It is unfortunate that the illuminating value readings were not taken at Southington; so that the loss in candle power could have been determined. But the readings would have had to be made under exactly the same conditions and with the same burner. In Mr. Brewer's paper the readings on different burners are compared so that each one may draw his own conclusions from the type of burner used. A different gas would give results at variance with these figures. The calorimeter readings would be more consistent; and when the hydrocarbon vapours are lost, and a drop in heating value is noted, you generally count upon a drop in illuminating value—say, a loss of each 7 B.Th.U. equalling a loss of one candle. In summer you can at times transmit gas under pressure for some distance with little loss, especially if the gas contains but a small percentage of hydrocarbon vapours; but if the percentage of these vapours is high, a corresponding loss will be experienced. If we compress a 22-candle power carburetted water gas, made under normal conditions, to (say) 40 lbs., and deliver seven miles, there will probably be a loss of 6 candles and a drop in heating value of about 40 B.Th.U., or (say) 7 B.Th.U. per candle. Dr. Beardsley's figures show a loss of 10 to 12 B.Th.U. per candle loss. This, to me, indicates that his candle-power readings were too high at the low-pressure end. The benzol and its homologues are responsible for the greater part of this loss. The vapour tension of the toluols and xylols being low, they drop out first and carry down the benzols with them. If these are all scrubbed out and benzol alone added afterwards, ordinary compression and cooling will affect the quality of the gas to a small degree, as the compressed and cooled gas will carry enough benzol to hold up its illuminating value. This is an expensive method of enrichment, and at present is to be avoided. In our argument before State or governing authorities in favour of low illuminating value gas, we should bring up the fact that what we want first is a gas that will give the best service to the consumer, and a tender gas will not give this service. The New Haven tests show that the richer gases are tender and the upper candles are not permanent. With a rich tender gas, you cannot over-adjust or under-adjust an atmospheric burner without trouble—especially an inverted incandescent burner. In other words, the limits for good adjustment are very narrow, and any slight variation in quality or pressure produces carboning or roaring. When such a gas is compressed and cooled and transmitted some distance, these difficulties are removed, because the higher candle power or tender part of the gas has been eliminated, or the quantity of hydrocarbon vapours reduced, or, as an engineer has expressed it, the "trouble zone has been eliminated." This zone occurs in gas made on efficient processes, from 580 to 650 B.Th.U. or higher; with coal gas of over 15-candle power (argand); or water gas, over or about 18-candle power. A gas may possibly be made of qualities above these figures containing a small quantity of hydrocarbon vapours; but such a gas would be inefficient in the use of materials, or require selected or higher price materials. If we could supply at all times a gas of from 550 to 580 B.Th.U., and make no effort for high candle power, and deliver it at good pressure—say, never below 4 inches—we would never have a service complaint. A moderate variation in pressure would not cause carboning or back-firing. The Germans and English understand this, although their pressures are still too low. Their standard requirements of from 500 to 540 B.Th.U. have completely eliminated the trouble zone, and given the best service to their consumers.

Mr. ARTHUR HEWITT: We have been working in Canada for four years with the Government. Two years ago the Department of Gas and Electricity at Ottawa sent a Commissioner to England for the purpose of investigating the conditions under which gas was manufactured there. He was convinced that we were right in our contention that the candle power standard should be abolished and a reasonable standard of calorific value substituted; and when I tell you that we were working for 500 B.Th.U. gross, 575 B.Th.U. looks a very high figure. Unfortunately, he came across the line into the United States and got somewhat mixed up. He went back inclined to steer a middle course somewhere between the chaotic confusion of standards on this side and the fixed low standard prevailing on the other side. Recently I had a number of interviews with the Government, and had the pleasure of settling the condition that compromised between the Government Commissioner's report and what we were asking for. I find that the new standard to be fixed by the Government for a calorific value of the manufactured gas to be supplied in Canada, is to be not more than 540 B.Th.U. per cubic foot, and that no company will be subject to any penalty unless the calorific value of their gas should fall below 515 B.Th.U., or the average during any month falls below 525 B.Th.U. I am interested in getting protection for ourselves by not having anybody else get too far astray from the proper line. I would caution you that you do not accept offhand the report of the Joint Commission recommending 575 B.Th.U. as a standard, because they will back down from it very shortly. The argument that has been put up for 575 to 590 B.Th.U. by the previous speaker will lead you down to 500 B.Th.U., I am convinced. The recent decision in the case of the Gas Light and Coke Company of London makes a standard of 540 B.Th.U., but allows a variation of 7½ per cent., which brings it down to 499½ gross as the real standard of the Company; and this discussion should weigh heavily with those who are considering this matter from the Commission standpoint, with this exception: In England probably 80 to 85 per cent. of gas is coal gas and the rest carburetted water gas; in the United States almost the reverse of these figures is the case. But I am convinced that the conditions under which gas is commonly used by consumers differ so largely from the conditions that prevail in testing with the calorimeter that it has very little bearing upon the subject. How will the consumers get the benefit of the saving brought about by the lowering of the standard? If you are able to economize in the manufacture of gas, the public will eventually get the benefit of it. In Toronto they get it all. We do not, as a gas company, have any chance to profit, because we have a fixed condition as to dividend, and the public gets all the surplus; we cannot make any more money anyway. But, from a purely public standpoint, it seems to me there is nothing to be gained by getting the standard very far above 500 B.Th.U. Three years ago we got into very serious trouble because we undertook, regardless of the fact that we had a 16-candle power standard, to carry through a winter season some experiments to see how low we could go before anyone would know the difference. Nobody would have known it if somebody on the inside had not mentioned that something was being done. We stayed with it for three months and came out all right; and I do not think anything was so impressive upon the Government Department as the investigation it made at that time to see to what extent the variation in the B.Th.U. value of gas would affect the consumers. I went on a long way down the scale, because it was information we were after. We came to the conclusion that other people's finding did not help us very much. Supported by the arguments of the very highest grade of gas men in England and Scotland, we convinced the Government that a reasonably low standard should be fixed for the gas supply—to say nothing of the necessity for competitive advantage against the lowering of electric rates. I contend that we were right, and that we were working in the public interests, in seeking a lower standard rather than the high standard that had prevailed for so long, and which had produced so much economic waste.

Mr. HINMAN: The question of an official standard for gas has come up rather unexpectedly. Perhaps some of those present know that for twenty odd years I was the Inspector for the State of Massachusetts, and had, of course, to look after the standard; and since that time I have given considerable attention to it. In my opinion, inspection and publicity are about all that are necessary for gas regulation. Public sentiment will take care of the rest. I am very doubtful whether it is advisable to have any standard whatever for heating or lighting value—simply inspection and immediate publicity. The gas company in any given place knows better what value it can give than any board, commission, or inspector.

A paper, entitled "Gas Producers at Collieries for Obtaining Power and Bye-Products from Unsaleable Fuel," will be read by Mr. Mansfeldt H. Mills at the twenty-sixth annual meeting of the Institution of Mining Engineers, at Leeds, on Sept. 15 and 16.

An official report on the war, issued from Paris yesterday (Monday) week, stated: "The enemy having again dropped some shells on St. Dié, we fired on the gasometers of Ste. Marie-aux-Mines, causing an explosion." This station does not belong to either the Imperial Continental Gas Association or the Continental Union Gas Company.

ASH CONTENT AND COKING PROPERTIES.

A patent specification which has been recently issued, describing an invention of Mr. T. M. Hickman, claims to furnish a method of conversion of non-coking fuels into coking fuels.

Researches into the causes of coking have previously led to the conclusion that some of the organic constituents of the coal, of a resinous nature, were responsible for the coking property; and the published results of many investigators—notably those of Burgess and Wheeler—have all tended to confirm this conclusion. Indeed (writes the "Iron and Coal Trades Review"), we were just beginning to think that at last we did know a little about the causes of coking, and that the ultimate complete solution was only a matter of time and patience. But it seems that all these theories regarding resinous constituents are absolutely wrong; for according to Mr. Hickman, "the coking qualities of carbonaceous materials are primarily due to the presence of mineral compounds—notably aluminium and silica—containing in chemical combination therewith alkalies or alkaline earths, magnesium or iron, or such other metals as can take the place of, and have the same effect in the combination as, iron, and in such quantities as to obtain the property of great permeability and comparatively low fusibility, and of keeping the particles of the coke formed bound together." According to this theory, the higher the ash the greater the coking properties; and an explanation is at once afforded of the coking properties of clinker or blast-furnace slag.

TIME FACTOR IN OIL-GAS MANUFACTURE.

As the result of an elaborate theoretical and experimental investigation (described in the American "Journal of Industrial and Engineering Chemistry"), Messrs. M. C. Whittaker and C. M. Alexander have arrived at certain conclusions which may be noted with reference to the manufacture of oil gas. Four variables were considered—time, temperature, pressure, and concentration; but it was recognized that the time factor, which can be controlled by a variation in the rate of oil-feed, offers the most ready means of studying the attainment of chemical equilibrium, and apparatus was designed which would enable all the other variables to be kept constant during any one experiment. The deductions are as follows.

The control of the composition of the products obtained in the manufacture of oil gas involves not only thermodynamics, but also chemical kinetics.

In practice, equilibrium is not reached in the thermal decomposition of petroleum hydrocarbons. This is proved by the fact that a recirculation of the products, under the same conditions at which they were generated, results in a further change in composition.

The time factor, which is controlled by the rate of oil-feed, is just as important as are the other variables (temperature, pressure, and concentration), as it has been found that the compositions of the products obtained in making oil gas vary with the rate of oil-feed. Hence, from the standpoint of practical operation of an oil-gas plant, the rate of oil-feed offers an easily accessible means of control.

Maximum and minimum percentages of the various constituents in the products formed by the decomposition of petroleum and petroleum distillates by heat can be obtained by a proper adjustment of the variables.

Petroleum hydrocarbons can be completely decomposed into carbon and hydrogen only within well-defined limits of the four variables. In the investigation, the range of complete decomposition at a definite temperature and pressure was limited by the definite rates of oil-feed.

Oil gases containing equal percentages of illuminants can be produced at different temperatures by varying the rate of oil-feed. Such gas mixtures, though they have equal percentages of illuminants, do not in general have equal percentages of saturated hydrocarbons and hydrogen—*i.e.*, gases of equal illuminating values are not necessarily of equal thermal values.

In an isothermal decomposition of petroleum hydrocarbons, maximum yields of gas and minimum yields of tar are characteristic of equilibrium compositions.

Natural Gas in Canada.—Throughout the entire length of the intercolonial railway of Canada, running from the Atlantic seaboard to Montreal, the passenger cars are, says the "Journal of the Society of Arts," lighted with gas from the New Brunswick natural gas fields—the product having been successfully used in place of the Pintsch gas, with which the lights were formerly charged. Gas is also used exclusively as fuel and for power generation in the car-shops at Moncton; over 30 million cubic feet having been consumed in September last year. The steady and reliable heat, according to the report of the Canadian Department of Mines, makes it an ideal fuel for forges, furnaces, and gas-engines; no time is wasted in firing up; and there is a considerable saving in expenditure. The gas from the Canadian Pacific Railway well at Medicine Hat is bottled in steel flasks, 8 inches in diameter and 50 feet in length, and is shipped for use in lighting the cars. The pressure of the "bottled" gas is 1700 lbs.

EFFECT OF SPRINGS UPON WATER-LEVELS IN THE CHALK OF EASTERN SURREY.

By Henry Dewey, F.G.S.

[Extracts from a Paper read before the Institution of Water Engineers.]

The paper deals with an area of some 30 square miles situated in north-east Surrey between Epsom and Croydon. Most of this country consists of chalk; but a narrow strip along the northern edge is formed by the sands, loams, and clays of the Tertiary beds; and some plateaus and isolated hills on the east are capped with thick masses of pebbles.

The area is separated into two districts by a deep narrow valley in which the town of Croydon has in great part been built. On the west the ground is gently undulating with a general northerly slope; the fields being wide, bare, and exposed, contrasting in this respect with the deep sheltered dales and wooded hills lying to the east of the main valley. This change is abrupt and conspicuous; and when its cause is sought, the importance of the beds of pebbles mentioned previously is realized. The abrupt change of topography and scenery is due to the oncoming of these pebble-beds. They are permeable to rain, and form an arid and poor soil suited to the growth of pine-trees and heath; and the wild moor-like commons at Shirley, Hayes, and West Wickham are due to these beds.

The levels of the water in the many deep wells have been recorded by several observers, including the Croydon Water Authority, and these results have been published from time to time. Lucas was the first observer to give details; and his figures are useful for purposes of comparison with present-day records. Among later records, the figures published in the "Memoirs on the Water Supply of Surrey, and on London Wells," furnish useful data. Perhaps one of the most important facts observable from an inspection of the data is the complete indifference of the water to the dip and character of the beds of chalk. To illustrate this point several series of wells along the dip-slope have been taken. The results are as follows:

Table showing Dip of Chalk, Gradient of Water-Level, and Ratio of Dip to Gradient, between Localities given.

Section A runs from Woodmansterne Rectory (**20**) *through Woodmansterne Village* (**21**) *and Banstead Asylum* (**10**) *to Belmont Workhouse* (**12**).

	Between 20 and 21. Feet.	Between 21 and 10. Feet.	Between 10 and 12. Feet.
Dip of chalk	1 in 51	1 in 51	1 in 37
Gradient of water-level ..	1 in 108	1 in 220	1 in 388
Ratio	1 to 2	1 to 4	1 to 10

Section B runs from Red Lion (**51**) *through Woodcote Grove* (**54**) *and Little Woodcote* (**22**) *to Barrow-Hedges* (**16**).

	Between 51 and 54.	Between 54 and 22.	Between 22 and 16.
Dip of chalk	1 in 91	1 in 45	1 in 51
Gradient of water-level ..	1 in 94	1 in 170	1 in 618
Ratio	1 to 1	1 to 4	1 to 12

Section C runs from Stoat's Nest Farm (**50**) *through Great Woodcote* (**27**) *and Woodcote Hall* (**52**) *to Hogpit, Carshalton* (**24**).

	Between 50 and 27.	Between 27 and 52.	Between 52 and 24.
Dip of chalk	1 in 67	1 in 41	1 in 34
Gradient of water-level ..	1 in 119	1 in 180	1 in 300
Ratio	1 to 2	1 to 4	1 to 10

Section D runs from Kenley (**38**) *through Roke Farm* (**32**) *Russell Hill* (**28**) *and New Barn Farm* (**29**) *to Carshalton* (**24**).

	Between 38 and 32.	Between 32 and 28. (24).	Between 28 and 23.	Between 29 and 24.
Dip of chalk	1 in 91	1 in 30	1 in 35	1 in 63
Gradient of water-level ..	1 in 180	1 in 177	1 in 200	1 in 760
Ratio	1 to 2	1 to 6	1 to 6	1 to 12

If the range of fluctuation of the water-levels be considered, a very remarkable difference is seen to exist between the groups of wells situated respectively east and west of the Croydon Valley. This is indicated in the following tables, which show the annual range of fluctuation in feet for both wet and dry years.

Range of Fluctuation of Water-Levels in Surrey Wells.

	Dry Years. Feet.	Wet Years. Feet.	West of Croydon.
	5 ..	16	Great Woodcote (27)
	3 ..	9	Woodmansterne Village (21)
	5 ..	16	Little Woodcote (22)
Average ..	4⅓	14	
			East of Croydon.
	20 ..	76	Slynne's Oak (42)
	9 ..	36	Addington Lodge (45)
	19 ..	53	Selsdon Well (43)
Average ..	16 ..	55	

From these figures it is seen that the range of fluctuation of the

water-level remains constant in the wells both of the western and eastern district; but the two groups differ widely from one another. There is nearly four times as great a range in the wells on the east as there is in those on the west; the figures being 4⅓ feet and 14 feet on the west, and 16 feet and 55 feet on the east.

As to the causes of the difference, the supply of water is, in both cases, the rainfall. There are no published data relating to the percolation of rain over the area; but it is probably greater between Epsom and Croydon, owing to the bareness of the chalk, than it is east of that locality, where wide spreads of Tertiary beds and clay-with-flints form the surface. The impermeability of these beds would tend to increase evaporation and decrease percolation, and so equalize the amount of water entering the chalk of the two areas. The difference of fluctuation must, therefore, be due to the escape of water which has already penetrated the chalk. Pumping may cause some of the difference. But in Lucas's time there were not many pumps working; and the difference was then even more pronounced than now. There is, however, a very obvious source of exhaustion in the many powerful springs which gush out from beneath the Tertiary beds at Ewell, Carshalton, and Waddon. These emit annually many millions of gallons of water, and the continual drain on the underground resources must tend to lower the water-level permanently. The actual quantity escaping in recent years from these springs has not been gauged, or if it has the results are unpublished, so that Lucas's figures must be resorted to in calculating the effect upon the water-levels. According to Lucas, the amount of water which gains access to the chalk of the drainage-area feeding these springs is 89,229,388,800 gallons annually, equivalent to a daily average of 244,464,078 gallons; while the amount flowing away at the springs is 39,156,680 gallons, or, in other words, as much as 16 per cent. escapes annually. On the east of the Croydon Valley, there are none of these powerful springs; and all the water that percolates into the chalk flows down beneath the Tertiary beds and tends to raise the water-level over the whole catchment area.

The question of the cause of the springs is an obscure geological problem; but some significant facts may be mentioned. First among these is the faulted nature of the chalk near the outcrop of the Tertiary beds between Epsom and Croydon. Almost everywhere in this district when artificial sections are cut in the chalk small slips and faults are exposed, upon which water accumulates as drops, or sweats-out from the rock. Similar faults are seen east of Croydon, but not nearly so frequently. The chalk, however, is jointed; and it is along these joints that the underground waters flow rather than through the rock-mass itself.

Another feature of the western district is the presence of a series of shallow folds or undulations which lie on the main dip-slope. These increase in amplitude from Epsom to Sutton, where the dip is 10°, and decrease thence eastwards to Croydon, where it is only 1°. The dip of the main mass of the chalk is gently towards the north; but just beyond the outcrop of the Tertiary beds, it suddenly increases for a short distance, and thence flattens out into a gentle slope—thus forming a sort of step. This structure also ceases east of Croydon. All these structures are due to movements of the earth's crust, which resulted in the tilting and folding of the beds, while accommodating themselves to the smaller space they had to occupy on account of contraction; and the beds which suffered most deformity were those which are now exposed on the west side of the main valley. It is significant that, with the oncoming of the massive pebble-beds on the eastern side of the Croydon valley, the deformity and faulting of the chalk diminishes in amount, and the emission of springs ceases. There can, therefore, hardly be a doubt that the phenomena are correlated, even if the absence of springs is not consequent upon the presence of the pebble-beds.

The chief points of the paper may be summarized in these words: Two contiguous areas differ markedly from each other in the movements of their subterranean waters. This difference is caused by the emission of springs in one area and their absence in the other, which in turn is due to differential effects of folding and faulting of the rocks of the two districts, and by the presence of massive beds of pebbles on the east, and their absence on the west. The rise and fall of the underground water in the eastern district is about four times as great as that in the western district; while the amount of water escaping at the springs is equivalent to one sixth of that which percolates into the chalk over the catchment-area. From these figures it may be inferred that the underground waters follow defined channels rather than flow through the interstices of the mass of the chalk.

DISCUSSION.

The President (Mr. F. W. M'Cullough, of Belfast) said the members were much obliged to Mr. Dewey for his paper. It would be very interesting to those in the neighbourhood deriving their water supply from these particular strata. He proposed a vote of thanks to the author.

Mr. T. Molyneux (Stockport) seconded the motion, which was heartily passed.

Mr. Baldwin Latham said it was about fifty years since he first became associated with the district referred to in the paper. His first gaugings were made in 1866 in connection with a large boring flowing beyond the fault alluded to by the author, and escaping into the Wandle. There had not been such a large flow there since that time; and the question arose how it was these bourns had diminished in recent years. The view generally taken was that it was entirely due to the enormous amount of pumping that had taken place all round London. There were now established a number of water-works dealing with millions of gallons of water per day; and so naturally it was concluded that they could not now have bourns of such great capacity as those of former years. He proceeded to question the accuracy of the Lucas gaugings, supporting his contentions by figures. He also instanced the difficulties of making accurate gaugings, by alluding to the quantity of water escaping into the sewers, and passing away to the sewage farm. Further illustrating the care that had to be taken in making gaugings, he asked where did the deep London wells get their water from. There was no direct communication between the chalk and the London wells; and yet chemical analysis of the deep-well water exhibited certain similar characteristics. It had been shown by Dr. Thresh that water which flowed through the Thanet sands produced water corresponding to the water yielded by the London wells. He (Mr. Baldwin Latham) had gauged as much as 10 million gallons a day flowing out of the Wandle; and his belief was that this went to help to supply the deep London wells. This showed how very careful one had to be in making gaugings. During the large number of years that he had been gauging, he found on the average that about 40 per cent. of the rain passed off from the springs in the Croydon area, and not one-sixth. Averages were of no value in matters of this kind; they had to deal with the minimum, and the minimum was often only one-tenth of the maximum.

Mr. W. Whitaker, B.A., F.R.S., F.G.S., pointed out that there was a distinct difference between the two areas referred to in the paper. It was not wholly a geological difference, but was partly a topographical one. As a matter of fact, the eastern area from the junction of the Tertiary beds and the chalk was what was called the high-level area, whereas the western area was the low-level one. This was one reason why they got the springs referred to on the west, but did not get them the same on the east. The springs did not rise to the high level. The result was the difference between the Croydon Valley and the Ravensbourne. They got no springs along the junction. Springs were obtained in the eastern area; but they were springs out of the Tertiary beds. The conformation of this area was due to the great mass of pebble bed referred to, which did not go beyond the Croham Valley. As to the decrease of the bourns, there was an enormous amount of water pumped out from east and west, which lowered all the levels. The bourns, however, still broke out, and water overflowed. Pumping went on; but this could not stop the bourns altogether. They might not be so big as they used to be; but they were large enough for all practical purposes. Take those that Mr. Latham gauged a little while ago. He gauged them once a week; and his highest gauging was 11,980,000 gallons per day, or something of that sort, despite all the pumping. When Nature took it into her head to give 3 or 4 inches of extra rainfall, it was quite enough to fill up all these bourns. Undoubtedly, there must be an effect from the pumping of the chalk; but this effect was not so great as some people imagined. Sometimes it was a large thing; but Nature was capable of dealing with it.

Dr. H. Lapworth (London) was inclined to think that the author's theory was the correct, or partly correct, one as to the causes of the fluctuations. It was very well known to pumping engineers that, if a pumping-station was put on top of a hill, there would be a fluctuation in supply; and the further one went away from a spring, there would also be greater fluctuation. This was the reason why on the eastern side of this area, there was a larger fluctuation than on the western side.

Mr. Henry Preston (Grantham), also on the point of fluctuation, wondered whether it was possible for the wells in the chalk on the east side of Croydon to be in any way connected with the springs on the west side. As the author explained, there was some sort of fault on the outcrop of the Tertiary beds; and, if this continued across the valley, it was a question whether the water did not travel forward to the same outlet. It seemed to him possible that, having a common outlet, and the rainfall being common, the variation in the amplitude of the wells should be dependent upon the distance travelled, or the friction, in the rocks. He should like to know whether there was a possibility of the water on the east side being connected with that on the west.

Mr. Dewey, in reply, said he was sorry he had to refer to Lucas's gaugings. He rather suspected they might be wrong; but he had no others to use. What caused the difference in the fluctuations of the wells east and west of the valley? The fluctuations were a fact, and they could account for them as they liked. Mr. Whitaker referred to the variations in the flow of the bourns being an effect of the pumping on the water-level. The water capacity of the chalk was limited; and he (Mr. Dewey) roughly estimated that 50 inches of rain would fill the chalk, so that it could not hold a drop more—that was, 50 inches spread over the year. With this rainfall, if the pumping diminished the amount of water in the chalk, annually the supply would be fully replenished.

Horley District Gas Company.—The Company's accounts for the last half year show an available balance of £1055 after providing for the fixed charges for interest; and the Directors recommend dividends at the rate of 5 per cent. per annum on the preference stock, 4 per cent. per annum on the "A" capital stock, and £2 16s. per cent. per annum on the "B" capital stock—all less income-tax. These will absorb £977. The works, mains, and plant have been maintained in good and efficient working order by the Manager, Mr. R. Seymour Tobey.

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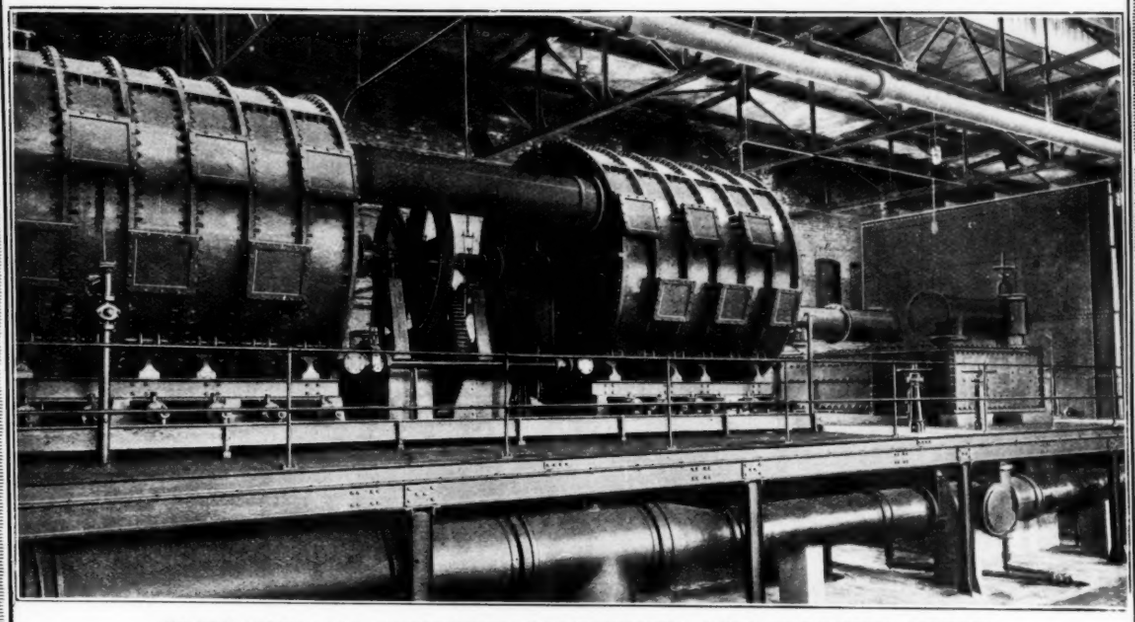

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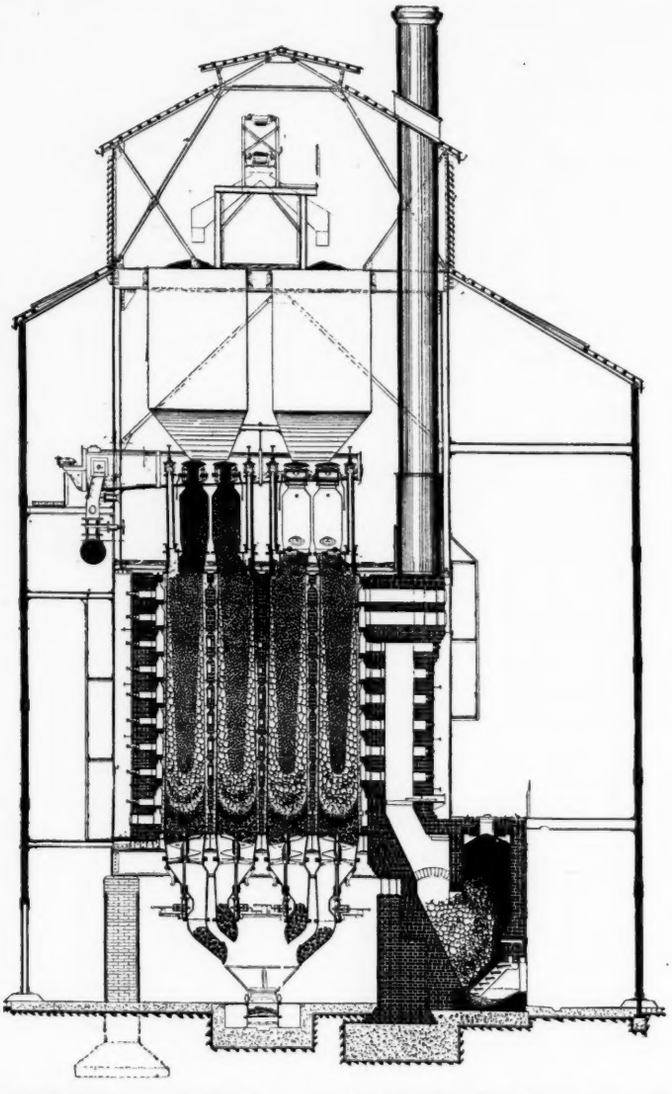

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Conversion of Consols into War Loan.

SIR,—In the course of his speech at the half-yearly meeting of the Gaslight and Coke Company, Sir Corbet Woodall said [see "JOURNAL," *ante*, p. 297] : "Among their investments, the Company have a sum of £221,000 in Consols standing to their credit at a book-value of 75 per cent. In view of the depreciation they have suffered, it was thought wise to write them down to £66 2s. 3d.—the figure at which, on conditions, they can be converted into the new war loan. This writing-down has cost some £18,000. With the assistance of the Company's bankers, arrangements have been made to convert the net amount into war loan; and the result will be a considerable increase in the yield of interest on this investment."

The majority of gas companies have their reserve and other funds invested in Consols. Many, no doubt, have also subscribed to the new war loan; and the question of exercising the option of converting a portion of their Consols has either been settled by them or will soon be under discussion. It is true, as Sir Corbet Woodall says, that an increased return to his Company will result from conversion. The terms offered by the Government have been widely accepted as generous. But how long the conversion will operate to the advantage of stockholders seems to be an open question. After ten years—any time between 1925 and 1945—the Government may redeem the 4½ per cent. war loan. And the writer of a pamphlet ("Keep your Consols") considers it "largely within the sphere of probabilities that by 1925 both the Money Market and the Investment Market will have recovered to such a natural position that the conversion of the present war loan, *plus* any future issue that may be necessary, will be possible on a 3½ per cent., if not on a 3 per cent., basis." If so, he asks, what will be the position of a holder of Consols who voluntarily converts to-day, and is compulsorily converted back to 3½ or 3 per cent. in ten years?

In considering the question, it must be remembered that, when the Government credit has again reached a 3½ per cent. basis, the present-day Consols will be quoted at about £71 7s. 6d. per £100 of stock, or on a 3 per cent. basis Consols will be quoted at about £83 5s. per £100 of stock. The writer submits examples showing the likely position in which holders may find themselves at the end of ten years, assuming that the additional interest is treated as capital (average rate of income-tax 2s. in the pound).

EXAMPLE I.

A holder of £1000 nominal of Consols who converts will at the end of ten years (Dec. 1, 1925), have received 10½ years' interest at 4½ per cent. on £666 13s. 4d. of new stock.	£315	0	0
Less average tax of 2s. in the pound	31	10	0
	£283	10	0
Repayment of principal	666	13	4
	£950	3	4

EXAMPLE II.

A holder of £1000 nominal of Consols who does not convert will, at the end of ten years (Dec. 1, 1925), have received 10½ years interest at 2½ per cent. on £1000	£256	5	0
Less average tax of 2s. in the pound	25	12	6
	£230	12	6
Market value of Consols, Dec. 1, 1925, on a 3½ per cent. basis	713	15	0
	£944	7	6

Showing an apparent profit of £5 15s. 10d. in ten years.

EXAMPLE III.

Taking, however, the market value of Consols on a 3 per cent. basis	£832	10	0
And the net interest as above	230	12	6
The resulting total of	£1063	2	6

shows to the converter a loss, which will be real, of £112 19s. 2d.

From the point of view also of revenue-earning, a Consol holder who converts to-day may find himself at the end of ten years in a worse position :

Holder of £666 13s. 4d. of new war loan (received in exchange for £1000 Consols) reduced to 3½ per cent. per annum—annual income 3½ per cent. per annum on £666 13s. 4d.	£23	6	8	gross
Holder of £666 13s. 4d. of new war loan (received in exchange for £1000 Consols) reduced to 3 per cent. per annum—annual income 3 per cent. per annum on £666 13s. 4d.	£20	0	0	gross
Holder of £1000 Consols who has not converted—annual income 2½ per cent. per annum on £1000	£25	0	0	gross

To an individual who desires an immediate increase in income, the conversion scheme has its attractions; but in the case of a company with perpetual succession, it is probable that in the long run it would be of advantage to retain its Consols. Some, notwithstanding any potential loss of capital, may, of course, from a patriotic point of view, choose to convert.

F. A. GULLAND,
Accountant, Maidstone Gas Company.

Maidstone, Aug. 14, 1915.

Dutch Mantles.

SIR,—Will you permit me to add my quota of testimony to that of Mr. Garland, *re* above.

Having had personal experience of the German mantle industry since its inception, and studied its methods for the conquest of the British and Colonial markets, I should like to warn the British mantle manufacturers that patriotism ends with the pocket, and that alone will not win the world's markets for us. The public will not buy sixpenny British mantles if there are others at threepence; and for this reason we must now commence to cheapen our produce by imitating the German system.

We must have thorium made and owned by an association of British manufacturers; and we must have magnesia rings, collodion, &c., and all adjuncts for the manufacture of incandescent mantles, in the hands of manufacturers, in order to compete with Dutch, Swiss, Danish, or any hybrid pseudo German hirelings. Thorium can still be obtained at 28s. per kilo. in Germany; and even at this price the "ring" obtains about 200 per cent. profit. The British manufacturer has to pay £2 per kilo.; and there is only one firm who by Government favour can supply it, even at this price. Magnesia rings are unobtainable, as the only German firm in England is under the control of a few makers, while the "owner" is interned.

The emissaries of the Hun are already covering all our colonies with Dutch and Swiss mantles; and by the time the war ends "business will be as usual" in German hands. We have a perfect right to the trade of our own country and colonies—dearly bought by the best of British blood; and we must now commence to find effective means to keep our funds for our own kith and kin.

I suggest a strong association of manufacturers, without any oppressive methods or inquisitorial dictates, on the lines of the British American Tobacco Company; and we must organize a campaign by advertisements in the trade and public Press—giving cogent reasons for the support which is now more than ever necessary for the consolidation of our home finance. I shall be glad to act as Honorary Secretary; and my collection of proofs from the Fatherland will certainly open the eyes of our indifferent manufacturers.

M. H. HERSEY.

Bethune Road, Amhurst Park, N., Aug. 18, 1915.

REGISTER OF PATENTS.

Removing Sulphuretted Hydrogen from Coal Gas.

BURKHEISER, K., of Hamburg.

No. 1415; Jan. 19, 1914. Convention date, March 4, 1913.

The invention described in patent No. 16,172 of 1912 related, the patentee states in his specification, to a process for the absorption of sulphuretted hydrogen from gases by means of an alkaline solution containing ferric hydroxide in suspension, for regeneration of the alkali from the alkali sulphides formed, and also some sulphur for the purpose of enabling cyanogen to be absorbed and to form alkali sulphocyanide compounds. Regeneration of the ferric hydroxide from the sulphide is effected from time to time.

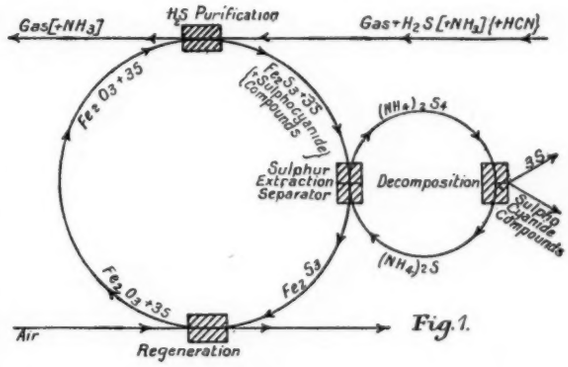


Fig. 1.

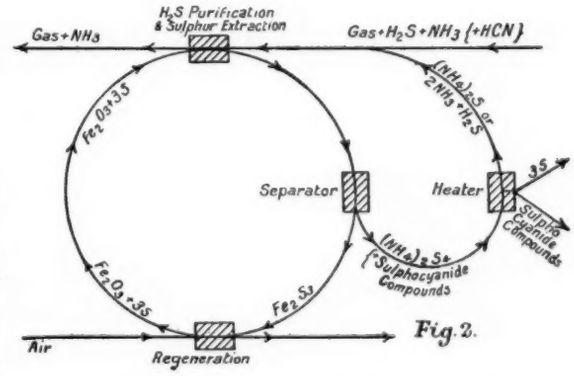


Fig. 2.

The present invention consists in a process for absorbing sulphuretted hydrogen in which the spent mass resulting from the purification, as described in the patent of 1912, is treated directly with alkali sulphides for the recovery of free sulphur by solution—the residual mass containing iron sulphide being oxidized so as to obtain a mixture of hydrated iron oxide and free sulphur for further use in the purifying process.

A method of working is described in which are employed for the gas purification an alkaline elutriate of metallic oxide—in particular, oxide of iron or hydrated oxide of iron—and sulphur. It consists in exposing

the mixture of iron-sulphur compounds and sulphur then arising, before it is in any way oxidized, to the action of alkali (ammonium) sulphide, and then undertaking a separation of the liquid and the solid portions. These solid constituents then consist only of iron-sulphur compounds, which on their part are oxidized to hydrated oxide of iron and sulphur, and thus give rise to a similar mixture which has served as the primary material for the gas purification, and which can therefore again be employed for similar purposes. The result is a complete circular process. The sulphur is withdrawn by the alkali (ammonium) sulphide, out of the circulation of the purifying mixture, in the form of alkali polysulphide, and removed by some known means. The alkali (ammonium) sulphide is here solely a dissolving medium, and does not enter into any other combinations. Hence the alkali (ammonium) sulphide is recovered, and, after the removal of the sulphur dissolved in it, is again available as a solvent medium, so that a second circulation results. Moreover, since all the reaction products result from the operation of gas purification itself and continually arise anew on carrying on the two circular processes, the process is said to be extremely economical.

The further development of the process relates to a specially suitable method of working, for the purpose of removing the sulphur from the alkali polysulphides formed in the process, and recovering them as a valuable commercial product. This feature of the present invention is to heat the liquid containing the alkali polysulphides to a temperature of 90° to 100° C., at which temperature the alkali polysulphides decompose, with the separation of sulphur. In this operation sulphuretted hydrogen or sulphuretted hydrogen and ammonia are set free, while the sulphur sinks to the bottom in a flocculent, easily separable form, and can be separated from the supernatant liquid by filtration.

This method of working, it is claimed, is specially suitable, and to be recommended, for gases containing cyanide. For, in the above-mentioned process of sulphuretted hydrogen purification by means of an alkaline elutriate of iron oxide or hydrated oxide and sulphur, in the case of gases containing also cyanogen, the cyanogen is removed from the gas and taken up by the alkaline elutriate in the form of sulphocyanide compounds. The sulphocyanide compounds are then (as easily soluble compounds) dissolved in the liquid, and, after the separation of the liquid from the solid constituents, remain in the liquid, mixed with the alkali polysulphides.

If, now, the liquid is heated to the temperature at which the alkali polysulphides decompose with separation of sulphur, it is possible to recover the sulphocyanide compounds separately in a simple manner. This is said to be especially economical, because it renders possible the conversion of these sulphocyanide compounds into ammonia within the limits of the actual coal distilling operation, either by the employment of the process described in patent No. 15,977 of 1912 or by any other known means, and of thereby attaining quite a considerable increase in the yield of ammonia.

By this further development of the process, therefore, the impurities, sulphuretted hydrogen and cyanide, utilizable hitherto with difficulty (or not at all), are simultaneously with the purification of the gas recovered in the form of valuable commercial products—precipitated sulphur, sulphocyanide compounds, or ammonia—in the continuous operation of the actual coal distillation.

A further advantage of the employment of the present invention consists in returning the gaseous decomposition products (sulphuretted hydrogen, or sulphuretted hydrogen and ammonia) resulting from the recovery of the sulphur, with the decomposition of the polysulphides, into the process again—that is to say, into the stream of gas before its entry into the sulphuretted hydrogen purification apparatus. The sulphuretted hydrogen purification and the solution of the sulphur are then preferably accomplished in the same apparatus by regulating the quantity of iron used and by the length of time the gas is in contact with the washing liquid; so that all the oxide in the purifying liquid is converted into sulphide of iron in that portion of the purifying vessel into which the impure gas and the above-mentioned gaseous decomposition products enter. This enables the free sulphur to be dissolved by the above-mentioned dissolving agents or decomposition products entering with the gas—see diagram, fig. 2. Or the sulphuretted hydrogen and ammonia may be brought into contact with the mixture of iron-sulphur compounds and sulphur in a second apparatus (fig. 1), which "would probably be preferable as a rule, because a more concentrated solution of alkali polysulphides is obtained."

Controlling the Flow of Gas in Purifiers.

BEARD, G. F. H., SCOTT, J. W., and R. & J. DEMPSTER, LIMITED, of Manchester.

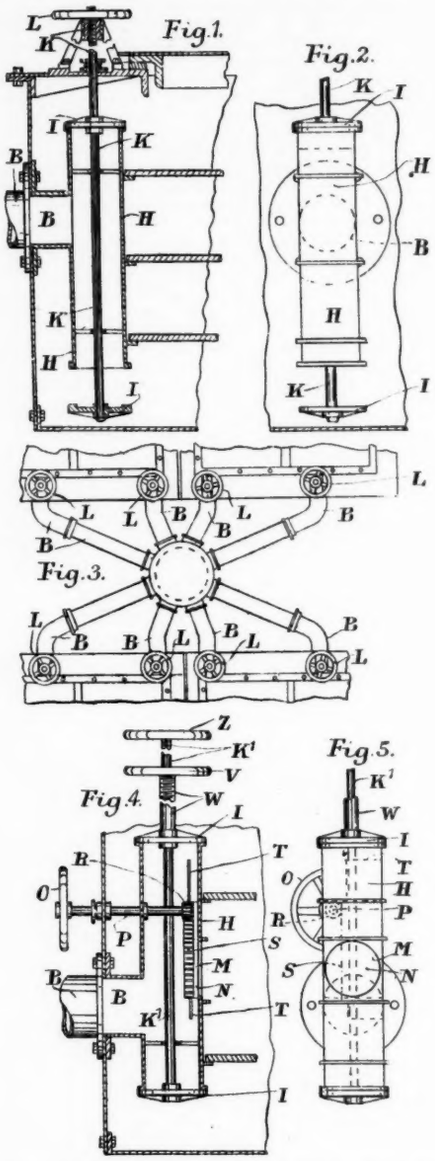
No. 844; Jan. 19, 1915.

In order to control the flow of gas in purifiers, so that the cycle of operations for the whole system is not interfered with for the time being, the patentees propose to provide each box of the purifier system (or as many boxes as desirable) with internal controlling devices, in the form of valvular connections, between the fluid apertures of each box and the interior of them.

Fig. 1 is a sectional elevation of a portion of a purifier according to the invention, and fig. 2 is a view at right angles (with certain portions omitted). Fig. 3, on a larger scale, is a plan of a portion of a purifier system, with an ordinary centre valve and its connections shown—some portion relating to the present improvements being indicated.

Each gas inlet and outlet aperture for the purifier is in communication with a casing or lute H, which can be opened at the top and closed at the bottom, or *vice versâ*, by means of valves I attached to a spindle K, under the control of an external handwheel. Thus, if the aperture B in fig. 1 represents the gas inlet for the time being, and the lower valve I be lowered as indicated, then if the upper valve I in the corresponding lute at the outlet of the purifier be opened when its lower one is closed, the gas will pass from the inlet and flow through the purifier from below upwards—termed by the patentees "a diagonal tendency of flow." By reversing the arrangement in both lutes, the gas will similarly pass from the inlet and flow through the purifier box from above downwards, or with a diagonal tendency reversed in direction or manner. This enables the gas, on first entering a box, to be brought into contact with purifying material which is least fouled; the direction of flow of the gas through the material being under control in the manner described.

But the general direction of flow of gas through the system will not be interfered with—that is to say, with reference to fig. 1, although the gas may continue to enter by way of the inlet B, its direction of flow may be from the lower end of the casing H, and upwards as it passes across the purifier; or the direction may be reversed, so that the gas may emerge from the upper end of the casing and then pass downward in its travel across the box, according to the manipulation of the valves I—the pipe B remaining the inlet for the gas, as already stated.



Beard and Scott's (R. & J. Dempster) Purifier Valve Control.

With reference to figs. 4 and 5, the lute H, forming one of a pair in a box, as in fig. 1, is shown not only capable of being opened at the top or bottom, but also can be opened at some position between. For the latter purpose a port M is shown in the casing, which can be closed by a slide valve N, capable of operation by the handwheel O, through the spindle P, pinion R, and rack S—the latter projecting from, and attached to the back of, the valve N. A feather T, projecting from the wall of the casing H, engages a groove in the rack S for guiding it. The upper valve I is under the control of the handwheel V through a threaded hollow spindle or sleeve W; while the lower valve I is independently under the control of the handwheel Z through the threaded spindle K^1.

Assuming the gas connection B in fig. 4 to represent the gas inlet for the time being, then if the outer port M in the casing be opened, and the upper valve I in the corresponding casing at the gas outlet of the box also be opened, the gas will enter the box for purifying purposes at the central zone, and flow upwards through the box in order to pass out at the outlet. But if the lower valve in the corresponding casing at the gas outlet be opened, instead of the upper one, the gas will again enter the box at the central zone, but will flow downwards in order to escape at the said outlet. If both valves be opened at the corresponding casing named as the gas outlet, and the aperture M at the gas inlet B be opened as before, then the gas will again enter at the central zone

named; but part of the gas will pass upwards and part pass downwards before escaping at the outlet of the box.

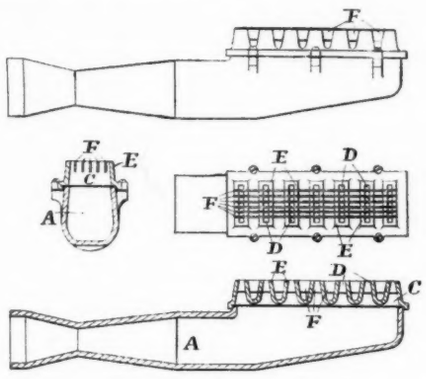
In all the methods described, the cycle of operations for the whole system is not at all interfered with.

Bunsen and Air Blast Burners.

DAVIS, H. N., and TWIGG, W. R., of Luton.

No. 20,538; Oct. 5, 1914.

The object of this invention is to warm the secondary air before taking part in combustion, "so as to assist more effectively in the atomization of the gases." The burner is formed of a number of passages having independent walls; the passages being subdivided into orifices by plates which bridge channels or gaps between the passages, so as to form air heating chambers between the passage walls and the plates in which the secondary air becomes warmed.



Davis and Twigg's Heating Burner.

The illustration shows a side view of the burner, a plan, and cross and longitudinal sections.

The mixing chamber A is provided with an open end upon which is fitted a casting C, having a series of passages D through which the gases travel from the mixing chamber to the point of combustion. Each passage is formed with independent walls, so that secondary air can circulate around them—the passages forming a series of burners with air channels between them. The passages are sub-divided into still smaller burners by partitions F, secured in slots cut in the passage walls transversely of the rectangular passages; and they are so arranged as to bridge the channels or gaps between the walls of the passages and allow air to pass beneath them to the intervening spaces between the plates.

When the burner is in use, the walls E and transverse plates F become heated, with the result that secondary air in contact with the walls passes to the flames of the burner in a preheated or semi-preheated condition—giving, it is said, "better heating results than when no warming of the secondary air takes place."

Gas-Generating Apparatus.

CARPENTER, H. A., of Sewickley, and RITER-CONLEY MANUFACTURING COMPANY, of Leetsdale, Allegheny County, U.S.A.

No. 5268; April 7, 1915.

A serious difficulty in the operation of coal-gas generating apparatus, the patentees point out, is the tendency of solids carried forward by the gas, or which form therein by condensation, to deposit on the walls of the off-take passage, and so clog and obstruct it as to greatly retard the operation unless the passages are frequently cleaned. In apparatus of prior design, the gas is conducted from the retort to the standpipe through a connecting passage "of appreciable length, which affords ready lodgment for the obstructing solids."

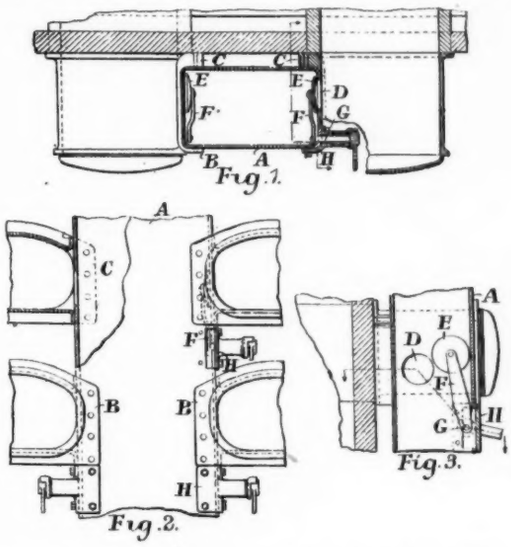
The primary object of the invention is to so construct and assemble the retorts or their mouthpieces and the standpipe as to eliminate a long connecting conduit by arranging the parts in abutting relation. The extent of the communicating opening is still further reduced by eliminating one of the abutting walls, so that the abutting portions of the closely adjacent parts are separated only by a single wall, through which the communicating port is formed.

In the present adaptation the adjacent side of the retort mouthpiece is open, and is adapted to fit against, and be closed by, an upright wall of the stand-pipe—the latter being provided with the port through which communication is maintained. Thus, while an efficient gas-passage is provided, a conduit or passageway of appreciable length is avoided. In forms of apparatus in which a standpipe is common to two upright rows of retorts, the pipe is simply fitted between the adjacent sides of the rows, closing the open faces of the latter, and providing a direct ported outlet therefor without the intervention of connecting conduits. A further purpose is to provide valve means of improved construction for controlling communication between the retorts and standpipe.

Fig. 1 is a sectional plan of a portion of a gas-bench equipped with the invention; the left-hand retort being shown in top plan, and the right-hand one in sectional plan. Fig. 2 is a view, partly in front elevation and partly in section, of retorts and a portion of the length of a stand-pipe. Fig. 3 is a vertical longitudinal section of a portion of a stand-pipe.

The retorts are set in a bench in the usual manner; and constituting an extension or continuation of each retort is a mouthpiece, the open outer end of which is closed by a door in the usual manner. The opposite side walls of the mouthpiece are equally spaced from the longitudinal centre of it; there being no lateral neck-like offset for connecting with the standpipe, such as is usually provided.

In order to eliminate the passage "of appreciable length" usually interposed between the retort or mouthpiece and the standpipe A, an upright wall of the latter is caused to abut one side of the mouthpiece. To minimize as far as possible the thickness of material between the mouthpiece and standpipe, an abutting wall of one of the parts is eliminated, so that they are separated only by the thickness of the wall of the other part. In the present adaptation, this is accomplished by forming the abutting face of the mouthpiece open, with the standpipe fitting and closing it. A structurally desirable arrangement is to form the outer end of the mouthpiece with a flange B and its inner end with a flange C, with the space between the flanges of just sufficient width to receive the standpipe and with the flanges secured to the latter—thereby firmly uniting the parts. Also, the top and bottom of the mouthpiece may be flanged for securing to the standpipe as shown.



Carpenter's (Riter-Conley Company) Retort Mouthpiece Apparatus.

When two tiers of retorts are connected to the same standpipe, the latter is simply fitted between them, as shown, eliminating the "objectionable lateral conduits" by providing direct connection between the standpipe and each retort through a port D formed in the standpipe wall.

When communication between the retort and the standpipe is valve-controlled, the valve E for each port D is of disc form and slidable on the inner surface of the standpipe; the surface providing an efficient seat, and the sliding of the valve and its pressure against the seat maintaining a gas-tight fit. Pressure of the valve toward its seat is afforded by the valve-carrying spring arm F, which is secured to the inner end of a shaft G extending through the wall of the standpipe beneath the retort and parallel with the axis of the port D. The shaft is rotatable in a housing secured to the standpipe, with a spring confined in the housing behind the handle-carrying head of the shaft for exerting pressure in a direction to hold the valve tightly on its seat. Thus the spring and the spring arm co-operate in maintaining the seat-cleaning and gas sealing functions of the valve.

The angular bracket-like portion H of the housing serves to close the slot or passage in a corner of the standpipe through which the valve E and its supporting and operating arm F are entered and removed without detaching them from the housing.

Manufacturing Sulphate of Ammonia and Purifying Coal Gas.

MACKENZIE, J., of Middlesbrough.

No. 10,059; April 23, 1915.

This invention relates to the manufacture of sulphate of ammonia direct from the sulphur and ammonia compounds contained in gases generated by the dry distillation of coal; the process also serving simultaneously for the purification of such gases.

It is well known, the patentee points out, that coal gas contains sufficient sulphur to combine with the ammonia compounds also contained therein to form sulphate of ammonia; and several methods have already been proposed for effecting this combination—such methods being based mainly upon the principle of passing the gas, freed from tar, over heated oxide of iron, the oxygen of which reacts with the sulphur, contained in the gas as sulphuretted hydrogen, or other sulphur compounds, and produces sulphurous anhydride, which combines with the ammonia in the gas. It has also been proposed to employ nitrates for washing-out ammonia from coal gas; and in a process for desulphurizing gas obtained by the distillation of shale or mineral oil, it has also been proposed to utilize oxides of nitrogen for freeing or oxidizing the sulphur in sulphuretted hydrogen formed by hydrogen from an outside source combining with the sulphur in the gas—the freed or oxidized sulphur then combining with the ammonia in the gas to form ammonium sulphate, which is then removed. It has further been proposed in a process for the recovery or utilization from coal gas of ammonia in the form of ammonium nitrate or nitrite to bring the gas (before or after purification) into contact with uncombined nitrogen oxides or

oxyacids obtained by combustion with nitrogen and oxygen of gas which has already been freed from ammonia.

The present invention has for its object to effect an improvement upon these methods by subjecting the gases in a moist atmosphere to the action of a compound of nitrogen obtained (for example) from sodium nitrate or by the fixation of atmospheric nitrogen; the medium oxidizing the sulphur compounds in the gases to form sulphur trioxide, which, with the moisture, forms sulphuric acid. This at once attacks the ammonia in the gases and forms sulphate of ammonia.

The patentee passes the gas freed from tar containing the sulphur and ammonia compounds, together with a suitable quantity of nitrous acid or its equivalent in a moist atmosphere at about 200° Fahr., into a vessel in which all the sulphur compounds are oxidized as described and sulphate of ammonia is formed. If sodium nitrate be used as the source of the nitrogen compound, it is mixed with sulphuric acid and the nitric oxide driven off by steam. The sulphuric acid decomposes the sodium nitrate and the steam denitrates the mixture, and the moisture referred to above is supplied by this means. Any excess of the nitrogen compound can be absorbed at the termination of the process in sulphuric acid of (say) 70 to 80 per cent. strength, after which it is said to be of advantage to pass the gas through lime boxes or to wash it with sprays of milk of lime so as to remove not only all traces of nitrogen compounds, but also the carbonic acid present. The nitrous acid can then be expelled from the sulphuric acid by denitration, and again used in the process.

"As all the sulphur compounds are oxidized in the course of the process, the gas which previously contained them, and from which they have been eliminated, is simultaneously purified."

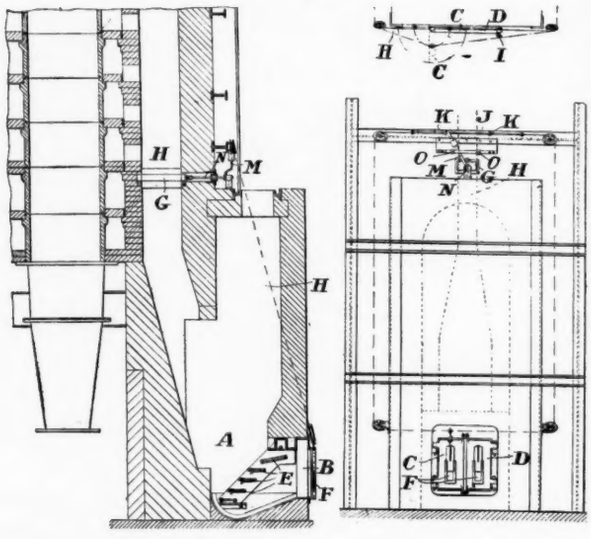
Gas-Producers.

GLOVER, SAMUEL, of St. Helens, and WEST, JOHN, of Southport.

No. 21,517; Oct. 26, 1914.

This invention has for it object to provide "in a simple and effective manner" for the regulation of the production of producer gas, so that, notwithstanding the opening of the producer furnace doors for clinkering the furnace, the rate of gas production is maintained uniform, "whereby economy of fuel and better carbonizing results are obtained, and excessive formation of clinker prevented—resulting in greater ease of manipulation."

The arrangement comprises the combination with a producer furnace having doors by which access is obtained to the furnace grate for clinkering purposes of means whereby the movement of the doors is transmitted to dampers for regulating the area of outflow from the producer, so that when the doors are opened the outflow area is correspondingly restricted so as to prevent any increased rate of flow of air through the furnace.



Glover and West's Air-Regulating Arrangement for Producer Furnaces.

A sectional end elevation and a front elevation are shown of a portion of a retort-setting with a gas-producer having the invention applied to it.

The producer A has a doorway B fitted with doors C D through which access to the furnace grate E is obtainable. Primary air inlets to the furnace are provided in the form of adjustable slide-controlled apertures F in the doors. These inlets (of considerably smaller area than the furnace doors) allow of the passage through the furnace of the requisite amount of atmospheric air having regard to the chimney draught and the quantity and quality of gas required. To ensure this, the furnace door is connected with the damper G, provided in the gas outlet passage H from the producer furnace, so that when the door is opened there is a corresponding closing movement given to the damper, and the rate of flow past the damper "maintained practically constant under all conditions." When the door is closed (as shown), the damper is opened to its maximum position.

One convenient means for interconnecting the door and damper comprises a chain I secured to the door by a bolt, and attached to the ends of a rod J having stops K on it for engaging the bifurcated end of the weighted arm M upon the damper spindle N. Adjustable stops O upon a fixed bracket limit the range of movement of the arm M. [illegible]

MISCELLANEOUS NEWS.

WANDSWORTH, WIMBLEDON, AND EPSOM DISTRICT GAS COMPANY.

The Half-Yearly General Meeting of the Company was held last Tuesday, at the Westminster Palace Hotel, Victoria Street, S.W.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. Charles W. Braine) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

UNDER WAR CONDITIONS.

The CHAIRMAN said it became his pleasant duty, if anything could be pleasant in this war time, to address the proprietors upon the accounts; and to make what report he could of their stewardship of the Company for the past six months. They met again under the dreadful cloud of war—sad, troublesome, ever-pressing, and ever impeding their operations, but giving them, on the other hand, some consolation in the opportunities it presented for making efforts to assist the powers—the War Office especially—in such things as explosives. The Company had given them men to the tune of 30 per cent. of the whole of their staff. Some 350 men had gone out from the Company's works. They had given fuel and facilities to the poorer people of their district, who had repaid them very much by flocking to them for gas during the last six months, frightened, he supposed they were, by the appalling rate at which coal threatened to, and did, rise at one time.

INCREASED PRICE OF GAS AND DIMINISHED DIVIDEND.

The accounts, looking at the circumstances, he thought were very satisfactory. The profit did not quite equal the dividend; but this he would deal with later. As the proprietors were aware, it became necessary, to the deep and bitter regret of the Directors, to raise the price of gas. Raising the price of gas always throttled business. This had ever been the view of the Board. Fourpence per 1000 cubic feet (which was the amount by which they had increased the price) was the least that any Company had put up the charge for gas in London or the neighbourhood. It had been advanced 4d. by the Commercial Gas Company, 6d. by the Gas Light and Coke Company, and 8d. by the South Metropolitan Company, who were their nearest neighbours. But although their own Company did not put up the price much in amount, it was much when they had regard to the very low figures at which they were supplying their district, beginning with, in the largest part, 1s. 9d. to the ordinary consumers. It was a great grief to the Board to have to raise the price at all; but at one time the complexion of things looked very dark. For a time they could not get coal at all. When they could, what they got came with heavy expenses upon them; and there was every probability, as far as they could see, that these expenses were going to accumulate. So it came about that the Directors were able to give the proprietors, in proportion to the increase in the price of gas, only a diminished dividend—diminished by ½ per cent. on the bulk of the stock, because 4d. per 1000 cubic feet was the exact equivalent of four half-crowns per cent., which, by their Act of Parliament, was the amount by which they had to lower the dividend. It so happened, in connection with the Mitcham proprietors, that, as the Directors put the price of gas down last year, and for three months in the corresponding half year they did not get the extra dividend, they did not suffer by comparison quite so much as the Wandsworth proprietors—the reduction of dividend to the Mitcham proprietors being only 7s. 6d. per cent., as against 10s. But for the December half year, they would lose the full 10s. per cent.

RECENT COAL HISTORY.

The question of coal had been a very pressing and troublesome one, and a cause of great anxiety to both officers and Directors. A general problem of late had been the diminished quantity of coal which they could get. Strange to say, after the contracts had been made they were found to be incapable of fulfilment by the collieries; and yet they could buy coal from some of the collieries at higher prices, by some double-shuffle which he confessed he did not understand—at any rate, it did not seem quite straightforward to him. This led the Directors to take joint action with the Directors of the larger Gas Companies. As representing the Gas Companies' Protection Association, he (the Chairman) had to take a rather strong personal part in this matter. They had to interview the Board of Trade repeatedly; and ultimately they had a conference with something like half the members of the House of Commons, who assembled in one of the large Committee rooms to hear what the gas companies had to say about this matter. And they were rather surprised by the information that was then laid before them. He (the Chairman) hoped the proprietors had read the report of the Committee who were appointed to deal with the allegations of the different parties who are complaining—the gas companies, the water authorities, the municipal suppliers of gas and electricity, and others. The report was a very instructive one; and, he ventured to say, it did not redound particularly to the patriotism or the independence of those who were connected with the supply of coal in the North. It was not for him to say too much; but he thought they had nothing much in the way of respect to offer to those who would attempt, in a national crisis like this through which the country was passing, to make a profit out of the extremity of the nation. At any rate, the gas company representatives explained to the members of the House of Commons how they had gradually increased to an enormous extent the use of gas by the working classes, and that they had now a very much larger number of working class consumers than they had of the superior class; and it was a little curious to see the effect of this information upon the average member of the House of Commons. These working class consumers were all voters; and, as the proprietors knew, they were people who did not submit to much injury without shouting loudly. The consequence was that there appeared a chance, if something was not done in respect of coal, of

there being a row in the constituencies. Gas companies had, through the supply of gas by means of prepayment meters, become very largely democratic institutions. The companies depended now for their revenue very much more than they did twenty years ago upon the large number of people who were called the working classes, though he doubted whether they worked any harder than he did. This resulted in the report from the Committee distinctly recognizing that the practices in the North were not to be commended, and that there should be at any rate a limitation put upon the way in which coal was leaving the country, and in directions which might possibly benefit the country's enemies. Restriction was therefore put upon the export of coal; and this at once produced an enormous relief to the British users of coal for all public service purposes. At the same time, when the Company came to make their contracts for the coming year, they had to pay a price 3s. per ton in advance of what they paid before. Therefore he was bound to warn the proprietors that the accounts before them showed a much lighter expenditure for coal than the accounts would do for the next twelve months, because in the present ones they had been using the arrears due on the old contracts which they had at a lower rate.

THE SALE OF GAS.

The sale of gas was reported as having shown a decrease of 0·8 per cent. in the past half year. This was rather increased during a few weeks in the present half year. But he was glad to say there were now signs of improvement; and he hoped they would not have a reduction in the half year in gas income.

CAPITAL EXPENDITURE ON METERS, STOVES, AND ANOTHER SHIP.

The capital expenditure had been comparatively small. He was in the habit of pointing out that the expenditure on capital should not be in the same ratio as the increase in the sale of gas, if they wished to improve their financial position. He regretted to say this time he was beaten by circumstances. The expenditure in the half year was chiefly on meters and stoves, which the Company supplied in large quantities as compared with previous experience. The public were evidently turning from the coal merchant to the gas company. They noticed that the price of gas was only increased by a few pence, whereas their coal bills had mounted up; and so they came to the company for stoves in order to save their coal bill. To have refused these consumers would have been a foolish thing indeed. Therefore, though money was dear, the Directors found it prudent to spend in the half year £8500 upon meters and stoves. They had also to increase their fleet of waggons and motors, for improving the distribution of coke and other goods, and in order to improve the stocks of coal at the various works, which stocks had fallen through the delay to the ships the Company already possessed owing to Admiralty precautions. On these additional waggons and motors, they spent £2963. The Board also bought another steamer, which increased the capital account by £12,100. With this third steamer, they were now in a position to be practically independent of the various incidents and delays due to war regulations. All these three lines of purchase some people would say were liable to depreciation and waste. So they were; but the Board did not let them waste. He had a letter from one proprietor—who pointed out that these were wasting assets. They were not. The Board kept their ships well insured, and well written down for depreciation. They did the same with meters and stoves, and waggons and motors. On capital account during the half year, they had spent £23,547, which was practically 2½ per cent. increase on the standing capital; and more than half of the increase was due to the Company possessing their own ships, which was a good form of property for them. The larger companies who did not own ships were now rapidly procuring them, because they found that to rely upon outside freights at a time like this was perfectly ruinous. The proprietors would see that this was good policy when he told them that this Company were actually asked to pay a freightage of 13s. per ton for an extra cargo of coal they needed; but the party concerned rebated it afterwards under strong protest. The average cost with their own ships for the same duty was nearer 4s. per ton, and less than that in ordinary times; so the proprietors would see the economy of the Company being shipowners.

SHORTAGE OF PROFIT DUE TO EXCEPTIONAL CHARGES.

The result of the half-year's working was that the profit balance of £30,120 did not meet the dividend by £5050. But if the proprietors looked at the last lines on the expenditure side of the revenue account, they would see that a sum nearly equal to this amount had been paid away in unusual charges. There was food allowance to their workmen due to the war, £2128; there were the contributions to the dependants of employees who had joined the colours and were on active service, £2811; and there were the discounts, amounting to £50, to those institutions which had taken in Belgian refugees. Therefore, but for these exceptional charges, they would have about earned the balance of £5050 required to pay the dividend. As it was, they had to go to their accumulations for the sum.

THE DEPRECIATION OF INVESTMENTS.

He was reminded by a proprietor who had written on the subject, and by the report of the Auditors, that the securities in which the Directors were unwise enough to invest the reserve fund had gone down £7000 or £8000. To have kept the money in the business of the Company would have been a wiser thing to have done, because it would not have depreciated. This depreciation had not arisen alone in the past half year; and there was no reason why the Board should ask the proprietors to forego a quarter part of their dividend on this occasion, because the depreciation had been gradually accumulating for some six or seven years. The most they could have done with it would have been to have stated in the accounts that the figures represented cost price, and to add that the securities would not sell for so much to-day. But the Directors were certainly not going to sell them to-day. In the case of a sliding-scale company with power to raise the price of gas on emergencies, there was no occasion to sell the securities in which their reserves were invested. Nothing short of a serious accident would cause the Directors to think of selling any of these stocks. Whenever they came back to their original value, or anything like it, they would have to write them up again. At the meeting of the Commercial Gas Company a few days ago (of which Company he, Mr. Jones, was Deputy-Chairman), Mr. George Ennis, who was for some time an Accountant of a large company, said that to write down the reserve fund to the present depreciated value of investments would be a great mistake; and the Chairman (Mr. W. G. Bradshaw) said he had only alluded to the matter because the Official Auditor of the Board of Trade desired it. Their own Company were not under an Auditor of the Board of Trade; but they were under strong Auditors. Their leading Auditor (Mr. Burton) was well known to be a very exact gentleman. The Auditors mentioned the matter of the depreciation of value; but all they meant to do was not to charge the depreciation to the account of dividend, but to write off the amount in the statement of accounts. When the proprietors desired this, the Directors would do it; but he (the Chairman) strongly recommended them not to desire it. Regarding the dividend, he ought to have mentioned that the full upkeep of the undertaking had been well maintained. They had spent upon the maintenance of the works within a fraction of 4d. per 1000 cubic feet; and they had spent on distribution, repairs, and renewals a sum of close upon 5d. per 1000 cubic feet. This constituted a very ample, and more than ample, allowance, to maintain the concern in the best possible condition, both financially and practically in operation. They had also written off part of the suspense account, which stood at over £12,000 in last year's account. This was now reduced to £9920; and the Board hoped the next three half years to extinguish the amount altogether. He had great pleasure in asking the proprietors to accept and pass the report and accounts.

The DEPUTY-CHAIRMAN (Mr. R. Garraway Rice) seconded the motion.

Alderman T. R. PORTER said he was in full accord with the Directors and supported the report. From the formation of gas companies, there had never been such a critical period as the present; and he thought it was well this should be brought home to people. In regard to the consumption of gas, he took it the only loss was in consequence of the lighting being stunted by the authorities. [The CHAIRMAN: Largely.] As to the 4s. for the carriage of coal, against 13s., was the 4s. the ordinary freightage? [The CHAIRMAN: By our own ships.] This showed the want of patriotism that existed among the shipowners. Concerning the investment in Consols, he believed it had been the established security in which reserves were placed. [The CHAIRMAN: By law.] And by law they had unfortunately been brought down very low. But the Company were only placed in a similar position to other companies and individuals. They were all suffering from the same thing. Under the circumstances of the times, the Directors had got out a splendid report; but the proprietors had to remember that the position might be worse twelve months hence.

The motion was unanimously carried.

THE DIVIDENDS.

The CHAIRMAN moved the next resolution, to the effect that dividends be declared at the statutory rates per annum, less income-tax: On the "A" stock, £7 17s. 6d., on the "B" stock £6 7s. 6d., on the "C" stock £5 10s. 3d., on the Wimbledon stock £5 15s., on the Epsom stock £6 7s. 6d., and on the new ordinary stock £5 10s. 3d. He explained that, of the Wandsworth "A" stock, there only existed £15,000. He thought the proprietors were to be congratulated upon getting dividends of these amounts.

The DEPUTY-CHAIRMAN seconded the motion, which was unanimously carried.

HIGH EXPLOSIVES AND MUNITIONS WORK.

The CHAIRMAN said he did not think the proprietors would like to part without recognizing the efforts of their officers—from Mr. Braine, their oldest officer, down to the smallest boy. All were doing their best in these troublous times. Both Mr. Carr and Mr. Braine were strenuous officers; and they were backed-up by very energetic and valuable officials at all their three works, and by equally valuable officers who took care of the whole of the distribution. These were backed-up by foremen and superintendents, and these again by cheerful, willing, profit-sharing workers, who largely represented those who had gone away to the war, and with whose dependants the Directors were now dealing. Some of their men, to the great regret of all, had fallen in the country's cause. Mr. Carr held a distinguished position; having been selected to help Lord Moulton's High Explosives Committee in working, through twelve counties in the South of England, to secure the greatest appropriation of toluol from the gas made by the different gas undertakings. It had been found that toluol was largely used by their enemies, who had been conservative of this particular explosive, and had been storing it up for some years. Mr. Carr was one of those appointed to meet the emergency—not only in connection with his own works, but at others—by inspecting, exhorting, and enabling the managers to be up to date in absorbing this valuable explosive from the gas. He (the Chairman) thought it right to report the compliment their Engineer had received, as he felt that the proprietors would be gratified to know it. [Hear, hear.] One of his assistants (Mr. E. J. Fottrell), who looked after the distribution of gas, was employed by the Munitions Committee to promote the production of shells, fuses, and other munitions of war. He was local agent for the Munitions Committee, and was doing yeoman service. So it would be seen that the Company were, through their officers and men, doing a great deal to actively help in the war. They were doing the same through machinery, and, in fact, were assisting in every possible way. They were also giving the Munitions Committee the use of a large store and a wharf and dock at Wandsworth. He knew that in this respect the Board had only anticipated the wishes of the proprietors. The Company were not making a penny profit out of it.

Alderman PORTER, in seconding the motion, said it was a great pleasure to the proprietors to know what was being done by the Company to aid the country in these days of emergency. The Chairman, he believed, was a member of the Munitions Committee; and he knew that all, from Mr. Carr and Mr. Braine downwards, were working well.

The motion was cordially passed.

Mr. BRAINE and Mr. CARR acknowledged the compliments paid to them, their assistants, and the employees generally.

THANKS FOR THE BOARD.

Mr. R. L. ANDREWS moved a vote of thanks to the Chairman and Directors. He remarked that it was a great relief to the proprietors to know that gas companies were paying their dividends while so many other concerns were not doing so. He inquired how the proprietors responded to the recent issue of capital. While thanking the Chairman and Directors for what they had done during the past six months, he asked the proprietors to extend to them their sympathy for what they had got to do during the next twelve or eighteen months.

Mr. SAMSON seconded the motion, which was heartily agreed to.

THE RECENT ISSUE OF CAPITAL.

The CHAIRMAN, in replying on behalf of his colleagues and himself, referred to the recent issue of capital. He said the appeal they made was for £46,500, which was not a large sum, seeing that they owed their bankers a great deal more. The result of the sale was that they only placed £17,598; leaving £8841 of ordinary stock and £17,972 of debentures still to dispose of. They could have placed the whole amount, but did not think it wise to put the undertaking under a debenture obligation at a higher rate of interest than was offered. It had occurred to the Directors that they might, on the next occasion, offer the stock among the proprietors, instead of selling it by auction. It was, however, very difficult to deal with these odd amounts; and so they would bring out more stock if the Treasury would allow them to do so, in order to make a round sum of it. He was certain, if the Directors circularized the proprietors, they would be willing to make a good response by taking up a further amount of the stocks.

CROYDON GAS COMPANY.

The Half-Yearly General Meeting of the Company was held last Friday, at the Company's Office, Katharine Street, Croydon—Mr. CHARLES HUSSEY, J.P., in the chair.

The SECRETARY (Mr. W. W. Topley) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

STABILITY AND SALES OF GAS.

The CHAIRMAN, in moving the adoption of the report and accounts, said the conditions affecting the conduct of the business during the half year had in general not differed greatly from those which he had to describe to the proprietors in February last. Perhaps, however, the main points worthy of notice were a lessened cause for anxiety as to the supply of coal, the indications furnished by the accounts of their internal resources of financial stability, and the way in which the undertaking, in common with those of most prudently managed gas companies, obtained some automatic compensation for any temporary check in its progress, in the reduction of expenditure it was enabled to secure. The proprietors would have seen that the sales of gas showed a slight increase; and this, under the circumstances, was, he thought, a matter for satisfaction. Certainly in this respect they stood in a not unfavourable situation when compared with those of their neighbours who, like themselves, had had little or no output of gas for special war purposes. He was not sure that a largely increased sale of gas at the present time, if due to special consumption for military purposes, was to be desired. While a large increase in a given half year was a source of increased profit, it involved a heavy strain on the productive side of the undertaking at a time when the steps thereby necessitated were both costly and difficult. Moreover, such an increase was in its nature temporary, and an artificial inflation of output of this kind was likely to be followed by a time when it would be difficult, if not impossible, to maintain the sales of the preceding year, while the expenses incurred in meeting the temporary increase remained a charge upon the undertaking. If the proprietors referred to the statement in the accounts of the gas sold for public lighting, it would be seen that it amounted to less than one-half that of a year ago—a loss of output representing 13 million cubic feet in the half year. This was, of course, due to the restricted lighting enforced by official requirements. A loss, probably little if any less, was also due to diminished shop lighting. If they allowed for this, they saw that the ordinary growth of the business had—notwithstanding the general tendency to study economy in private life—been practically maintained; and, when return was made to more normal conditions, they might, he thought, reasonably expect to revert to the steady rate of increase they had in the past been accustomed to.

COMPENSATIONS.

The increase in the number of consumers was 435, in stoves on hire 1435, and fittings 1287. This was satisfactory progress, although not quite at the same rate as the Company had experienced in normal years, and were justified in assuming they would have experienced this year but for the special conditions prevailing. The addition of a new consumer, or the hiring of an additional stove, involved a good deal of outlay, which, under their method of dealing with expenditure, was charged at once to revenue - thus leaving the sale of gas in the future a source of increased profit freed from the charges incurred when the account was opened. When, therefore, as in this half year, the rate of growth was temporarily slackened, an immediate saving, compared with previous half years, could be effected; and this would be seen in most of the items under the head of distribution. In saying this, he did not wish in any way to belittle the efforts which their officials in this department, in common with others, had made, and made successfully, to effect the economies which were incumbent upon the Company, as upon all the nation, during the time through which they were now passing.

COAL AND QUALITY.

On the manufacturing side, it would be seen that gas had cost about the same, notwithstanding the increased price of coal. In fact, coal, oil, &c., after deducting the returns from residuals, was substantially lower than a year ago. The price of coal was not the only unfavourable circumstance the Engineer and his staff had had to contend with. The difficulties as to supplies (at one time a matter of the gravest anxiety) had necessitated working under conditions dictated less by considerations of economy than by availability of raw material. They had not been able to scrutinize as closely as they could wish to do the quality of the coal they had been able to secure; and considerable expense had been incurred in working from old stocks of coal and in storing coal in unusual positions. That, under these conditions, such good working results had been obtained, was a circumstance on which they should heartily congratulate their Engineer and those who had assisted him.

POSITION OF RESIDUALS—ADVANTAGES AND DISADVANTAGES.

The receipts from residuals were, in the main, satisfactory. In regard to coke, they had benefited by the enhanced prices of fuel generally; and sulphate of ammonia was, both as to working results and as to the price obtained, very satisfactory. The average price of their sales was £12 12s. 7d. per ton, against £11 6s. 10d. last year. This was due chiefly to the elimination of German competition—about the only benefit received on account of the war—in the export market; but sulphate of ammonia makers would do wisely not to forget that this elimination was in all probability a temporary one only. The proprietors would remember that little more than a year ago the falling value of sulphate of ammonia was a matter of very grave concern to manufacturers in this country. A method of manufacture by synthetic means direct from the nitrogen of the air had been discovered, and made (by Germany) commercially practicable, with the result that a production limited in extent only by the relation between the cost of manufacture—which was said to be low—and the price obtainable, was to be looked for in the near future. This menace to the price was now, fortunately for British makers, removed. But it was for the time only; and it was reasonable to assume that, with the return of the world to peace and to industrial ways, international competition between makers of sulphate would again become keen. In the future, as the Sulphate of Ammonia Association had been pressing upon the notice of manufacturers, quality would be a very important consideration in assisting in the disposal of the product; and in this direction they might, he thought, congratulate themselves on the fact that the Company had, for some time past, consistently conformed to the highest standard regarded as obtainable by manufacturers in this country. Tar had shown rather disappointing results. He had on a previous occasion explained the difficulties created by the war in disposing of one of its chief constituents, pitch. They had also been to a large extent deprived of the sale of tar for road-making, through Government action, due to the wish to recover the largest possible quantity of high explosives from the coal and its products. Such tar as they had sold had had to be specially treated—this resulting in increasing the cost to the buyers by about 50 per cent. They could not regret, much less complain of, this, so far as it assisted the nation in the successful conduct of the war; but the loss to the Company had been very great.

AT THE FRONT.

It would be seen from the report that more and more of their employees were leaving (in most cases, it was hoped, but temporarily) to serve their country as combatants; and now well over 200 were so engaged, afloat or ashore. Four, he regretted had given their lives; as to the others, the proprietors would, he was sure, join with him in an expression of hope for their welfare and safe return. [Hear, hear.]

CONSUMERS, EMPLOYEE CO-PARTNERS, AND STOCKHOLDERS.

The question of the price of gas was one which engaged the anxious consideration of the Directors in the early part of the year; and it was felt that, under the circumstances then existing, and in view of the grave difficulties in prospect, they could not with prudence avoid an increase. They, therefore, although with great reluctance, raised the price by 3d., as from Lady-day. The total increase, therefore, had been (with the previous penny increase) 4d.—an amount much less than that which many companies had found necessary. With the uncertainties as to the early future which still confronted all, the proprietors would understand that he could not say anything definite now as to their course of action. It would be unwise to reduce the price unless they saw a reasonable prospect of maintaining the reduction; and they had yet to bear the full incidence of the higher prices of coal. But he could assure the proprietors and consumers that, as soon as the Board considered it could be done with safety, they would have the greatest possible pleasure in announcing a reduction. The increase in price was felt by the co-partners, whose rate of bonus fell from 6 to 2¼ per cent. The last increase in the price would also cost the consumers about £18,000 per annum; and the Directors felt it would be right that the "A," "B," and "C" stocks of the Company, which were subject to the sliding-scale, should share in the general loss; so they recommended, as would be seen, dividends at a rate less by ¼ per cent. than those previously paid. This was relatively a much less reduction than in the case of the stocks of other companies whose price of gas had been advanced. He felt sure the proprietors of the "A," "B," and "C" stocks would, in common with the Directors, cheerfully bear their share of the general burden.

ISSUE OF NEW CAPITAL.

During the half year, it was found necessary to raise further capital; and the consent of the Treasury having been obtained, £25 000 "D" stock was issued by tender in March all at, or over, par. This result was one on which, under the then existing market conditions, they might regard as a testimony to their standing in the eyes of investors. The capital outlay necessitating this issue was chiefly the construction of the new gasholder tank, now completed, and the erection of the gasholder. Progress was still being made with the latter, although slowly, owing to the scarcity of labour, and to a partial diversion of the contractor's resources to meet Government demands. Though they would not have the holder available, as had been hoped, for the coming winter, the Directors thought they could count upon it being ready for use in the winter of 1916-17.

INCREASED STOCKS OF COAL AND OIL.

He was glad to say they had recently been able to largely increase their stocks of coal and, though to a lessened extent, of oil. But latterly they had been receiving greater quantities of oil; and their tanks were nearly full, so that they were less anxious on this head. At the same time, the Directors hoped that representations which had been made to the Government on behalf of the gas industry might

assist in increasing the availability of tank-steamers for the shipment of oil fuel. But on the whole, they were relieved of much of the anxiety as to raw materials which weighed upon them six months ago.

RENEWALS.

There was one item in the accounts to which he should like to refer, in justice to their Engineer. It would be seen that the charge under the head of "Repairs, &c., of Plant" was larger than a year ago. This was not due to any excessive expenditure, though they had been faced with the necessity of greater outlay on the renewal of retorts than in the corresponding half of last year. The increases arose from the fact that they had charged to revenue considerable sums which could have been spread over several half years. To this extent, the profits of future half years had been relieved of a burden they would otherwise have borne; and they would reap the benefit of this in the future.

THE NET RESULT.

The net result, as shown by the accounts, was a profit which, though not quite sufficient to provide dividends at the old rates, enabled them to pay them at the rates now recommended, and to increase the carry-forward by £400.

DEATH OF THE SENIOR AUDITOR.

He had left to the last mention of the great loss the Company had sustained, in common with many others, by the death of their senior Auditor, Mr. J. C. Benwell, which the proprietors would, he was quite sure, deplore as deeply as did the Directors. He had been a familiar figure at their meetings for many years—his connection with the Company as Auditor having lasted over 37 years (from 1878, when he succeeded his then partner in the office). During the last few years, his health had been failing; and on several occasions he was assisted in the work of the audit by his partner, Mr. Sloman, who, at the request of their surviving Auditor (Mr. John Jones), had assisted in the audit of the current half-year's accounts. Mr. Sloman had intimated his willingness to succeed Mr. Benwell in the office; and while the election of Auditors was a matter entirely for the proprietors, and one on which he would not wish to influence them, he might say that Mr. Sloman was fully qualified for the position, and conversant with the accounts. His appointment as a colleague would, he (the Chairman) believed, be acceptable to the present Auditor.

The DEPUTY CHAIRMAN (Mr. Thomas Rigby), in seconding the motion, observed that he considered the report very encouraging.

Mr. CHARLES WEBB said he noticed that the Directors had increased the price of gas by 4d. per 1000 cubic feet; and consequent upon this, there was a reduction of the dividend by ½ per cent. He should like for information to ask whether there was no margin which would allow them to raise the price of gas without reducing the dividend.

The CHAIRMAN replied that they could certainly have increased the price of gas without lowering the dividend. But the Directors thought—they were quite unanimous on the point—that the proprietors should subscribe something, seeing that the employee co-partners and the consumers would have to bear their part of the financial burden occasioned by the war. The Directors themselves were very large stockholders, so that they all took their share.

Mr. WEBB remarked that the Company were therefore in a much better position than was shown by the accounts. The proprietors still had a margin; so that they were not in at all a bad way. Gas stocks kept a good investment. [Hear, hear.]

The CHAIRMAN said he ought to explain that the Company had never paid full dividends under their statutory powers. The Board preferred to sell gas at a favourable price rather than pay dividends up to the hilt. Being strongly in competition with electricity, their best policy was to sell gas as cheaply as possible.

The motion was unanimously carried.

THE DIVIDENDS.

The CHAIRMAN said he should like to remark here, as the proprietors were aware, Sir Corbet Woodall generally proposed the next resolution. He (the Chairman) regretted to say that he had received a letter from him asking the proprietors to excuse his presence on this occasion. Sir Corbet was a particularly strenuous man; and he was not in the best of health. He was sure the proprietors would express their sympathy with him. [Hear, hear.]

Mr. WILLIAM CASH, F.C.A., then moved the declaration of dividends at the following rates per annum: On the "A" stock, 14½ per cent.; on the "B" and "C" stocks, 11½ per cent.; on the "D" stock, 5 per cent.; and on the "E" stock, 10 per cent.—all less income-tax. In the course of his remarks, he said the Chairman had dealt, in his usual clear and complete manner, with all the important features of the half year. The period had indeed been a time of considerable stress and difficulty for both the officers and the Directors. Their main requirement, coal, had given them a particularly anxious time. That the Company had come through so well was a matter for congratulation. The Chairman had explained the recommendation of the Board regarding the dividend. The consumers had to pay more for their gas, the employee co-partners' bonus had been reduced, and the stockholders were asked to share some part of the burden by taking ½ per cent. less. Nevertheless, the actual amount distributed on this occasion in dividend was slightly more than it was in the June half of 1914, because of the issues of stock in the interval. Having regard to this aspect of the matter, it was satisfactory that they had earned, and rather more, the full sum required, and were able to distribute more over the whole body of proprietors than they did in the corresponding half of 1914. He was sorry Sir Corbet Woodall was not present. The gas industry was greatly indebted to him for the valuable work that he had done in the matter of the supply of coal not only for this Company, but for all the other gas undertakings in the kingdom.

Mr. PERCY H. HALL, J.P., seconded the motion, which was unanimously carried.

THE LATE AND THE NEW AUDITOR.

Mr. J. T. MAITLAND remarked that it was with very great sorrow that the proprietors had heard of the death of their late Auditor (Mr. J. C. Benwell). They all deeply regretted the loss. However, they had now to elect his successor; and it gave him pleasure to propose that Mr. FrederickS. Sloman, A.C.A., should be elected to the vacancy. The Chairman had said all that it was necessary to say regarding Mr. Sloman's qualifications for the office.

Dr. CRITCHLEY, in seconding, said that in Mr. Sloman they had a gentleman who had an intimate acquaintance with the accounts of the Company; and therefore the work would come to him with considerable ease. Before seconding the resolution, he had ascertained that Mr. Sloman was a man most suited to the appointment.

The motion was heartily agreed to.

Mr. SLOMAN, thanking the proprietors for the honour conferred upon him in appointing him an Auditor of the Company, promised that the audit should be an efficient one. For the kind words used with reference to his late partner, he thanked them; and, when he saw the members of Mr. Benwell's family, as he did occasionally, he would convey to them what he had heard that day.

VOTES OF THANKS TO THE BOARD.

Dr. RODMAN said the proprietors had heard sufficient to assure them of the arduous duties that had fallen upon the Chairman and Directors during the past half year. In a time such as they had been through (he could speak from experience in a similar capacity in connection with another gas company), matters of very serious consideration had to come before the Board, and especially that of the purchase of coal. He was sure, under the circumstances, that they all felt, especially on this occasion, they owed a great deal to the Board. Had it not been for their assiduous attention, the stockholders would not have seen a balance-sheet anything like as satisfactory as the one submitted to them that day. He had therefore much pleasure in proposing a hearty vote of thanks to the Chairman and Directors.

Mr. WEBB, in seconding, remarked that, when he came to the Croydon Gas Company's meetings, he always went away feeling as though he had had a tonic; it was all so refreshing. He thought they ought to be very gratified that they had a Board of Directors of such ability looking after their affairs at the present time. They had been having a more strenuous time than ever before, and he hoped would ever have again. The fact that there were comparatively few present out of the large number of proprietors (he believed there were something like 3000) was an evidence of satisfaction. However, those present tendered to the Board their best thanks. He was afraid (but he hoped not) that there were bad times in front of them all; but the Directors were cautiously watching the times for them.

The motion was unanimously adopted.

The CHAIRMAN, on behalf of his colleagues and himself, thanked the mover and seconder for their kind words, and the proprietors for the manner in which they had unanimously endorsed them. He said he must confess that, in the early part of the six months, they had an especially anxious time, because they were running short of coal; and they did not know what was before them. He was happy to say they had passed through this stage; and they were not now in any state of anxiety regarding the coal supply for next winter—at any rate, they felt pretty well assured on the point. They had in hand to-day a large stock which they hoped to supplement. Still there was anxiety regarding the future. The war was not going as favourably as they could have wished; and it was hoped that it would not be long before they saw improved conditions in this respect. But whatever the anxiety, whatever the conditions, the proprietors might rely upon the Directors giving their best attention to the business.

OFFICERS, STAFF, AND MEN.

The CHAIRMAN said he had now a pleasing duty to perform, and for the forty-seventh time. This was to propose a vote of thanks to the officers, staff, and workmen for their efficient services. Mr. Caddick as Engineer, Mr. Topley as Secretary and Accountant, Mr. Sandeman as Distributing Engineer and Sales Manager, Mr. Anderson as Assistant Secretary, Mr. Haines, and Mr. Stones, were all, in their different departments, doing their best in the interests of the Company, and producing the best results they possibly could. The workmen were also working under as happy conditions as could be expected during these times of stress. The Company had assisted their men, and especially those who had gone to fight for the country's cause in the war. The Company were looking after the dependants of the men, and seeing that they were not suffering in any way. They had been able to sufficiently fill the places of the absent workers, though some of the men at home had had to do more than they did previously. Still they had buckled to, and had shown a strong disposition to do their best in the interests of the Company. As to their Engineer, he had had a very anxious time, especially during the period when they were running short of coal. Now he was having an anxious time respecting the tar, and the Government requirements. The Government had (so to speak) commandeered all the tar; and it had to be used in such a way as to extract the toluol from the gas for the making of high explosives. This had been a loss to the Company, because they made a better price by selling the tar for road making than in selling it after the toluol and light oils had been taken out. Mr. Topley had had an anxious time because all these matters created extra correspondence; but he had faced it all in the proper spirit. The time had also been an anxious one for Mr. Sandeman, because of the curtailment of street and shop lighting owing to Government restrictions. This could not be helped; it was inevitable. And Mr. Sandeman was doing his best to raise the demand in all ways possible.

Mr. SAMUEL SPENCER seconded the motion; and it was heartily passed.

Mr. A. CADDICK, on behalf of those engaged at the Waddon works, sincerely thanked the Chairman for the kind words he had used, and the proprietors for so cordially ratifying them. His words were particularly encouraging, and especially so during the strenuous period through which they were now passing. It was a pleasure to him to be able to say that those who were connected with him at the works had risen to the occasion, had tried to do their level-best, and had shown a determination to overcome the many difficulties that had to be encountered. He felt that, during the winter which they would soon have to face, he could reckon upon all—staff and men alike—continuing the good services they had rendered for many years past. On this occasion, he should like to express his personal thanks to all those with whom he was associated for their able and loyal assistance during the troublesome times. The Chairman had referred to the fact that

their coal stocks were considerably in excess of what they were this time last year; but apart from raw material, there were in the carrying on of a gas-works a good many difficulties in other directions which those unacquainted with the work could scarcely realize. They had to face these difficulties; and those working with him at Waddon would do their very best to carry through.

Mr. W. W. TOPLEY thanked the Directors and proprietors, on behalf of those associated with him in the secretarial and accountancy work, for the kind recognition made of their efforts. He also thanked those who had assisted him, and had helped to lighten his task. They were all delighted that, under the trying circumstances, the position had come out so satisfactorily.

Mr. W. J. SANDEMAN, on behalf of the distribution and sales department, also acknowledged the vote. He was happy to say that, notwithstanding the difficulties with which they had had to contend during the half year, things had gone very smoothly, owing to the loyal co-operation on all hands.

The Founder and Chairmen of the Company.

There were three portraits hanging on one of the walls of the meeting-room; and, at the conclusion of the business proceedings, the Chairman called attention to them. He said they were of very great interest to the Board of Directors; and he thought they would be of interest to the proprietors. One was the portrait of Mr. Henry Overton, the original proprietor of the Croydon Gas-Works in 1846. In 1847, the undertaking was transferred to a Company; and the second photograph was of the first Chairman, Mr. W. S. Owens. He was Chairman from 1847 to 1855. They had not a succession of the photographs of the Chairmen; and the third one was of Mr. Edward Berney, who was Chairman from 1865 to 1887. Mr. Berney was therefore Chairman for 22 years. By the indulgence of the Directors and proprietors, he (Mr. Hussey) had exceeded Mr. Berney's tenure of office by one year; for he had been Chairman 23 years. He hoped he had not done yet. [Hear, hear.] There was one interesting thing he ought to say about the portrait of Mr. Henry Overton. It was given to the Company by their Assistant-Secretary (Mr. Edward Anderson) and his wife. Mr. Anderson, by a stroke of good luck, was able to win the affections, and finally became the husband, of Mr. Overton's granddaughter; and it was due to this that the Company had become possessed of such a nice portrait of the original owner of the Croydon Gas-Works.

PORTSEA ISLAND GASLIGHT COMPANY.

The Half-Yearly Meeting of the Company was held in the new offices, on Thursday last.

The CHAIRMAN (Mr. R. Edgcombe Hellyer), in moving the adoption of the report and accounts [*ante*, p. 358], remarked that no useful purpose would be served in comparing the details of the working results of the half year under war conditions, with the corresponding half year of 1914, when peace existed; but it was highly satisfactory to know that the quantity of gas sold during the first six months of last year had been maintained within 2·74 per cent. This was the more gratifying having regard to the fact that in 1914 the half year showed an unexampled increase over any similar period; being no less than 8·79 per cent. in excess of the first half of the year previous. The sales for the six months under consideration had been adversely affected by the continued restriction of outdoor lighting and early closing of licensed premises, and also by the temporary diminished pressure necessary owing to the great difficulty experienced in obtaining adequate supplies of coal and oil. The number of consumers had increased in the six months by 899 to 50,233, and the cooking and heating appliances on hire by 1739 to 36,104; and he was confident that, had the conditions been normal, last year's sales would have been surpassed. The Directors and the Engineer and General Manager (Mr. J. D. Ashworth), as well as the Secretary and the Company's general staff, had had a very hard and anxious period. There had been times when their short stocks of coal had occasioned grave concern. At the Flathouse works, on one occasion, the coal supply was reduced to less than three-quarters of a day's consumption, and on another to half-a-day's requirements; while for days together the oil at these works had been entirely exhausted. At the Hilsea works the position had been slightly better; but the aggregate stocks had been as low as four or five days' requirements only. In consequence of this, it was necessary to reduce the pressure of gas in the district; and the quality at times fell below the usual standard. But though complaints had been received from a number of consumers, the great majority realized the Company's difficulty, and the thanks of the Board were due to them for the consideration they extended to the management. While on this subject, he wished to put on record the fact that, throughout all their difficulties, the Board had received the utmost consideration from the Corporation; and although in the performance of their duties they had more than once complained of the quality of the gas supply, at all times they were prepared, by interviewing the Board, to listen to and consider the explanation which the Directors had to offer. In addition to this, at the invitation of the Directors, a Committee of the Corporation had visited the works and seen for themselves, not only the very small stocks in hand, but also the inferior quality of the coal delivered. He also wished to acknowledge the assistance they received from the Government Departments and the railway authorities, both in London and Portsmouth, all of whom, recognizing the important purposes for which gas was being used by the Naval and Military authorities in the district, fully appreciated the vital necessity of avoiding any interruption in the supply, and had at all times been ready to do everything in their power to help the Company in the matter of transport of raw materials. The full statutory dividend was recommended by the Directors, and £2000 had been transferred to the extraordinary renewals account. This result, he thought, was highly satisfactory; but he wished to point out to the shareholders that there was a balance of £8351 to the debit of the extraordinary renewals account, without taking into consideration the large proportion of the cost of rebuilding the chief offices and show-rooms, which was in the nature of a renewal, and must, therefore, be paid for out of revenue. He reminded the proprietors that at the last half-yearly meeting, he had stated that owing to the favourable contracts which had been entered into for coal and oil, subject to deliveries being obtained, the Directors hoped to get through the half year without having to raise the price of gas. This hope had been realized; and, as far as could be seen, no advance would be necessary during the current half year, and every nerve would be strained so as to avoid such a necessity. Should the Directors' efforts meet with success, they would indeed have something to be proud of. Whether it would be necessary to increase the price next year, he was unable to say. A further source of difficulty which the management had experienced was the shortage of labour. Notwithstanding a substantial increase in wages having been granted to every class of employee, since the commencement of the war there had been over 500 changes among the workmen—equivalent, approximately, to the total number employed. Up to the present 17 of the staff and 155 workmen had joined the forces. Remarking on the new chief offices and show-rooms which the shareholders were invited to inspect, he stated that the premises were admirably adapted to the efficient conduct of the Company's business, and explained that the show-rooms had been designed with the object of giving to the public practical demonstrations of some of the many purposes for which gas was now used.

The dividend was declared, the customary donations were granted to the Portsmouth, Portsea, and Gosport Hospital, and to the Portsmouth Eye and Ear Infirmary, and the usual distribution of coke to the poor during the coming winter was authorized.

Replying to a vote of thanks to the Directors, officers, and staff, proposed by Mr. F. Blake, the Chairman stated that, from what he had already said, the shareholders would appreciate how strenuous and anxious the past half year had been for all concerned. For Mr. Ashworth, in particular, it had been trying beyond measure; and his utmost efforts had been necessary in meeting the many difficulties that arose. Mr. H. A. Stibbs (the Secretary), too, had been unremitting in his attention to the Company's interests; while the ready manner in which the staff carried out the increased duties imposed on them, in consequence of the reduced numbers, was highly appreciated by the Board.

SALISBURY GAS COMPANY.

Mr. Humphrys' Retirement.

The Annual Meeting of the Company was held last Wednesday—Mr. GEORGE FULLFORD in the chair.

The CHAIRMAN, when moving the adoption of the report and accounts, together with the payment of the usual dividends, said that the effects of the war had so disturbed and upset everything that any attempt to compare the working results with those of previous years was out of the question. The increased cost of coal and materials of all kinds, of labour, the gratuities to wives of men on active service (no one could say that gasmen had not given their full quota to the service of the country), the delay in coal delivery in the winter, and congestion on the railways had caused, and was causing, great inconvenience and expense. The past year had been most trying for all concerned, especially for the Manager. In several respects, however, business had been good. The sales of gas showed a substantial increase; and the dividends had been fairly earned on the year's working. New machinery was in course of erection, and when it was completed it would greatly facilitate the manufacturing operations. Although somewhat costly in the first place, it would prove economical in practice and of great assistance to the workmen. They were already aware that Mr. Norton H. Humphrys, who had been in the service of the Company for over thirty years—the last twenty as Engineer and Manager—had tendered his resignation. The Directors accepted the decision because they felt that the time had arrived when he might reasonably look for rest and relief from his onerous duties. His superior knowledge of the scientific as well as the practical part of his profession would still be in request, as it had been in the past, and as cheerfully devoted to the advancement of the gas industry. He would be succeeded on Oct. 1 by Mr. William Fielden, who had been for thirteen years Manager of the Staines and Egham Gas Company (now amalgamated with the Brentford Gas Company), and in addition had had seven years' gas-works experience at Todmorden, Aldershot, and Beckton. He held first-class gas engineering honours, and came with excellent credentials from the Directors at Staines and others with whom he had been associated. Last, but decidedly not least, the Directors desired to acknowledge the assistance of their valued Secretary, Mr. Whitehead, of Mr. Humphrys, and of the office and works staff. It might, perhaps, be invidious to mention other names; but there were others who had loyally considered the interests of the Company, to whom their thanks were also due, and were heartily tendered.

The motion was adopted, as were others declaring the dividend and re-electing the retiring Directors and Auditor. Next there was passed a vote of thanks to the Chairman, Directors, and officers of the Company for their services during the year.

Mr. HASKINS having replied on behalf of the Board,

Mr. HUMPHRYS said he could not too strongly support the recognition of the work done by the staff under the special conditions that had obtained. Going back over the last fifty years, the general operations had never experienced such an all-round upset, which, being quite unexpected, found them quite unprepared. They had been able to make arrangements for meeting the altered conditions to some extent; and with the help of the new apparatus now coming into use, his successor would, he hoped, have a less strenuous time. Speaking on his own behalf, he desired to acknowledge the kindly reception that had always been accorded to him at the shareholders' meetings.

The Waterford Gas Company have intimated an increase in the price of gas from 3s. 4d. to 3s. 9d. per 1000 cubic feet, owing to the increased price of coal.

MANCHESTER CORPORATION GAS DEPARTMENT WAR BENEVOLENT FUND.

On Aug. 11 last year, shortly after the outbreak of war, a meeting of the principal officials of the Manchester Gas Department was held, presided over by Mr. Frederick A. Price, the Superintendent; and it was decided to open a fund in connection with the National Relief Fuud, and make regular weekly contributions thereto during the continuance of the war.

Since the inauguration of the fund, the staff at the Town Hall have contributed to it £1042 11s. 2d., and the staff and men at the works, £1879 18s. 5d. Owing, however, to a large number of the contributors holding the opinion that there was no lack of employment in the district, and no evidence of acute distress necessitating continued efforts to ensure a large immediate income, it was decided last month to cease forwarding the weekly collections in the department to the Lord Mayor's National Relief Fund. But, having regard to the fact that so many of the employees in the department had answered the call of their country, it was decided, at a recent meeting of the principal officials, to establish a benevolent fund for the benefit of the members of the staff and workmen who might be injured in action, or to assist the dependants of the fallen. The new fund is entitled the "Manchester Corporation Gas Department War Benevolent Fund," and the Trustees are Mr. F. A. Price, the Superintendent of the Department, Mr. T. Williams, the Cashier in the Department, Hon. Treasurer, and Mr. G. W. Kaye, Hon. Secretary.

Weekly contributions are to be made by the employees in accordance with the subjoined scale; and by this means it is hoped that a substantial sum will be available for the Committee administering it. The scale (which was in operation for the relief fund) is, of course, subject to periodical revision as may be determined:

	Weekly Contribution.
Employees receiving under 10s. per week	1d.
,, ,, 10s. and under 20s. per week	2d.
,, ,, 20s. ,, 30s. ,,	3d.
,, ,, 30s. ,, 40s. ,,	4d.
,, ,, 40s. ,, 50s. ,,	5d.
,, ,, 50s. ,, 60s. ,,	7d.

Officials receiving—	Per Cent.
60s. per week and under £200 per annum	1½
£200 per annum and under £300 ,,	1¾
£300 ,, ,, £400 ,,	1¾
£400 ,, ,, £500 ,,	1¾
£500 ,, ,, £600 ,,	1¾
£600 ,, ,, £700 ,,	2
£700 ,, ,, £800 ,,	2
£800 ,, ,, £900 ,,	2¼
£900 ,, ,, £1000 ,,	2¼
£1000 ,, ,, £1100 ,,	2½
£1100 ,, ,, £1200 ,,	2½
£1200 ,, ,, £1300 ,,	2¾
£1300 ,, ,, £1400 ,,	3
£1400 ,, ,, £1500 ,,	3
£1500 ,, and upwards ,,	3

WAR BONUS QUESTION AT OLDHAM.

An Unusual Position: Workers Decline More Money.

A Special Council meeting was held at the Oldham Town Hall on Wednesday last to consider the question of granting a war bonus to the employees. As previously reported [*ante*, pp. 45, 307, 359], the original demand of the men was for a war bonus of 5s. for gas and water employees; but it was afterwards extended to other Corporation departments—a Special Committee being appointed to review the whole question. This Committee recommended an advance of 2s. per week to all employees above 21 years of age receiving less than 28s. per week, and 1s. to those receiving 29s.—confining the bonus to those whose wages with the advance will not exceed 30s. per week.

Prior to Wednesday's meeting this offer had been unofficially rejected by a large number of workmen who are members of the Gas Workers' Union and the Municipal Employees' Association. They pointed to the fact that last March (when the question of a 5s. bonus was first raised) the Council twice refused their demands; and they now threatened to strike unless their application was favourably considered or referred to arbitration. In the course of a letter addressed to the Town Clerk on Tuesday, Mr. J. R. Clynes, M.P., the General Secretary of the Gas-Workers' Union, wrote stating that those concerned in the original application had decided not to accept the proposed offer; and he further pressed their claims. The letter stated that if the offer of the Special Committee was confirmed by the Town Council, "the difficulties of reaching a settlement by negotiation will be increased, as you may not find it easy to reverse a decision which the men are quite unable to accept. . . . I have to state that the men are willing to accept an advance of 3s. per week, which is the advance already conceded by the Corporation to the higher paid tradesmen and artizans in the Corporation employment . . . and that it dates back to the time when the advance was given by the Corporation to the skilled workmen referred to."

At Wednesday's meeting the position of matters was discussed for an hour and a half. Mr. Clynes' letter was submitted to the meeting; and finally the members decided to approve the recommendation of the Special Committee [reported above]. The Mayor (Councillor Lees) said it was regrettable the decision of the Special Committee had been considered by the Trade Unions before the offer was formally made by the Council. In the past, the Council had acted towards their employees in a manner which had commanded the respect of the employees. The Corporation had gained a reputation throughout the country for dealing equitably, and in many respects generously, with their employees; and they did not want this pleasant feeling to pass away. But they (the Council) also represented the ratepayers, who included tradesmen and shopkeepers who were badly hit by the war, and the working classes, many of whom were very poor indeed. They felt that the offer of 2s. war bonus was a fair one. He reminded them that in the cotton trade the operatives obtained an advance (by arbitration) of 5 per cent.; and the Council were offering labourers an advance of 7½ per cent. The minimum wages paid to labourers by private employers was formerly 20s. per week; and these had obtained a war bonus of 3s. per week. But the minimum paid by the Corporation was 25s.; so that with a bonus of 2s. per week (as suggested by the Special Committee) the Corporation labourers were being paid 4s. per week more than fellow-labourers in private employment.

The number of men employed by the Corporation at a wage of less than 30s. per week is 1278. The 2s. per week bonus represents an increased annual expenditure of £6604. In addition, war allowances to men who have enlisted amount approximately to £14,664 per annum. If those now concerned in the proposed bonus were granted an increase of 3s. per week, it would mean an additional expenditure of roughly £10,000 per annum; and if the bonus was granted to those receiving more than 30s. per week (as was originally suggested), the amount would be about £20,500. In the "JOURNAL" for March 23 (p. 760) the number of workmen affected in the Gas and Water Departments by this application was given as 785—no fewer than 680 of these being in the Gas Department. The term "workmen" in this case included clerks.

CLONMEL GAS-WORKS IMPROVEMENTS.

The new retort house and equipment of up-to-date machinery at the Clonmel Gas-Works are now in working order. The retort-house is a concrete building, containing four beds of seven retorts, supplied by Messrs. Drakes Limited, of Halifax. These are capable of producing 40,000 cubic feet more gas per day than the old ones, and on a more economical basis. Some of the accessory plant was supplied by Messrs. James Milne and Sons, of Edinburgh. The old retorts are to be taken down, and the ground occupied by an additional coal-store. A new store, just erected, is within easy reach of the river boats; and to facilitate stoking, there is a lift by which full trolleys of coal are hoisted, so as to be brought on rails to the doors of the retorts.

The improvement in manufacture is shown by the fact that 12,000 cubic feet of gas per ton of coal are obtained in the new retorts, compared with about 9500 feet in the discarded ones; while the amount of coke available will be increased to about 10 cwt. per ton of coal carbonized, as compared with only 8 cwt. per ton formerly. About 12 per cent. less coal will be used in future. The daily output of gas has now been raised to over 200,000 cubic feet, which is ample for all the requirements of the town. The high price of coal has entailed an increase by 6d. per 1000 cubic feet in the price of gas; but when normal conditions are restored, the Gas Committee hope to make important concessions to encourage the general use of gas, not only for lighting, but for cooking and heating purposes. The Committee were fortunate in having as Consulting Engineer during the recent improvements Colonel Henry O'Connor, now Commanding the Forth R.G.A., who, during a brief visit, has expressed himself as most gratified with the efficiency of the retorts and the manner in which the works were supervised by the Manager and Secretary, Mr. Richard Kneeshaw.

It may be mentioned that the Clonmel Gas-Works were originally started by the British Gaslight Company in 1824. Sixteen years later, other works were started by the Clonmel consumers; and an amalgamation took place in 1880. Eventually, the Council purchased the undertaking, at a cost of £13,000; £3000 more being spent on buying outstanding interests and £2000 on much needed improvements. In the history of the undertaking there has been only one failure of the town lighting, which was due to the flooding of the underground portions on Christmas morning, 1895; but the interruption lasted only for a few hours.

Gas Poisoning Case at Belfast.—John Ritchie, an elderly man who lived alone, has been found dead in his house in Summerhill Street, Belfast, from the effects of gas poisoning.

Camborne Gas Company.—The annual meeting of this Company was held yesterday (Monday) week, with Mr. Charles Bryant presiding. Considering the abnormal times through which they were passing, the Directors are very satisfied, he said, with the statement of accounts presented; and he hoped the shareholders generally would share in their satisfaction. The Board had had to increase the price of gas by 3d. per 1000 cubic feet—making it 5s. gross—as from Ladyday last; and in view of the fact that the deliveries of coal in store for the six months ending June 30 cost 13s. 4d. per ton more than six years ago, and 6s. more than last year, a further 3d. would be added at Michaelmas. As compared with six years ago, the make of gas per ton of coal carbonized reached the very satisfactory figure of 12,012 cubic feet, against 10,265 feet; and this combined with the saving in leakage, or gas unaccounted for, had enabled them to sell over 5 million cubic feet more gas with a consumption of 25 tons less coal. A dividend of 4½ per cent. was declared. Replying to a vote of thanks, Mr. S. J. Ingram, the Company's Consulting Engineer, said he would not care to look forward to another winter like the last one. Any lapse which might have occurred in supplying gas to the district would have been disastrous. Although there were great difficulties experienced, yet the supply was not curtailed in any way; but at one time they found themselves within forty-eight hours of actually being without coal—during the time the Government demanded the railways. They would start next winter with a larger supply of coal than they ever had before; but the price was considerably in excess of previous years.

SUICIDE OF A GAS COMPANY'S OFFICIAL.

The Accountant of the Gas Light and Coke Company.

Last Friday an inquest was held by Dr. Waldo, at the City Coroner's Court, on the body of Mr. William Blakey, 42 years of age, who held the position of Chief Accountant to the Gas Light and Coke Company, in whose employment he had been for twenty years.

Evidence was given that the unfortunate man's accounts were absolutely correct; and it was stated that he suffered from delusions. He had lived for some time at Chisholm Road, Croydon, and leaves a widow and two children.

A brother of the deceased, Mr. James Blakey, a retired civil servant, of Purley, stated that his brother had suffered from nervous depression; but there was nothing much the matter with his health. He laboured under the delusion that he was followed by detectives. He first mentioned this about three months ago. He also had an idea that everybody hated him; but this was a subsidiary delusion. He had never threatened suicide; and the circumstances of his death came as a great shock to witness and the family. The deceased had no financial or other troubles; and he lived on the most affectionate terms with his family.

Further evidence showed that Mr. Blakey had not been to business since May. He had been under the care of Dr. Newby, of Croydon, and had also been seen by Dr. Mott and another brain specialist. On the previous Wednesday he told his wife that he was going for a walk "just going down the road"—leaving the house at 11 30 a.m. Three hours later he was found to have shot himself through the brain with a revolver while in an underground lavatory at Ludgate Circus. A new magazine pistol lay at his feet. In his pocket was found an envelope bearing the following: "My darling Ethel (his wife),—God bless you and keep you in His care." In a letter addressed to the Secretary of his Company, marked "Private and Confidential," the deceased wrote: "Dear Sir,—By the time you receive this letter I shall be dead."

The Coroner said that in the letter deceased denied that his supposed delusion was a delusion.

Mr. Henry Rayner, the Secretary of the Company, said that Mr. Blakey had been an officer of the Company for twenty years, and was a most able man at his work. He was very highly esteemed by the Directors and all his colleagues. His work had been much more arduous owing to the war, and he had felt the strain. His accounts were absolutely correct, witness added.

The Jury returned a verdict of "Suicide while of unsound mind."

FATAL ACCIDENTS IN GAS-WORKS.

At the Co-operative Institute, Woolwich, last week, an inquest was held on Alfred James Wheatley, aged 24, who died in the gas-works at Woolwich Arsenal. William Bade, a stoker at the gas-works, said on the night of the 11th inst. he was at work in the retort-house in charge of a new stoking machine, which had only been in use for four weeks. Deceased's duties were to open the lids while witness moved the machine from retort to retort. The machine was close to the wall, and deceased stood on the platform to get round it, when witness heard a cry, and found Wheatley pinned by the machine to the wall. Witness got him out, and he was taken to the Arsenal Hospital. Witness had been engaged on retorts for twenty years; but the appliance they were using had been newly erected. In reply to the Factory Inspector, witness said that the machine was not dangerous so far as its working was concerned; but it was fixed close to the wall. There were only 3 inches between the machine and the wall; but there was a recess, and Wheatley tried to take advantage of it to get under. Witness did not see him doing so, and started the machine. It was not possible to pass behind the machine except when it was opposite the recess in the wall. Mr. Asworth, the Inspector, in reply to the Coroner, said it was not intended that these recesses should form a means for going behind the machine. They were regular traps; and he had suggested that they should be filled up level with the wall. Mr. Hingston, for the War Department, said he understood that this suggestion was being carried out. John Tobin said he was working in company with the deceased and successfully passed behind the machine when it was stationary. Wheatley was following him; but the machine having been restarted he was caught and nipped. A walk of 50 or 60 yards was saved by taking advantage of the recess. It was dangerous to use the recesses; but as quickness of movement was necessary in opening and closing the lids of the retorts, they had used them instead of going round. Lieutenant Eves, of the Royal Army Medical Corps, said that when admitted to the hospital Wheatley was suffering from shock, contusion of the pelvis, and internal hæmorrhage. The latter and the shock caused death in a few hours. The Jury returned a verdict of "Death from misadventure."

Before the Coroner for the Camberwell District last Thursday, an inquest was held concerning the death of Horace Townsend, a leading hand in the distillation department of the South Metropolitan Gas Company, Old Kent Road. The widow said that she last saw deceased alive on the Saturday morning, when he left home for work. He was then in his usual state of health. Mr. Thomas Gibson, Works Superintendent, stated that about one o'clock the previous Saturday afternoon, Townsend, who was about his ordinary duties, suddenly collapsed and fell in the still-room. He was carried unconscious into the open air and artificial respiration was resorted to by the Company's ambulance men pending the arrival of a doctor, who pronounced life extinct. It was subsequently found that deceased had omitted to open the air-gauge box before starting the still to work, and had no doubt inhaled the vapour which had accumulated. There was no explosion whatever. He understood the work well. Dr. Ward stated that the cause of death was asphyxia from inhalation of gas. Townsend no doubt omitted to take the usual precautions. A verdict of "Accidental death" was returned.

Last Wednesday, Sir Thomas Bramsdon, the Borough Coroner, held an inquiry at the Town Hall, Portsmouth, as to the cause of the death of Thomas Alfred Atkins Hall, a workman in the employ of the Portsea Island Gas Company, who died as the result of an accident he sustained at the Hilsea Gas-Works the previous Sunday. The evidence showed that the duties of deceased—who was a water-gas operator, who had been in the employ of the Company 15 or 16 years—were in connection with a lift which hauled up skips of coke on to the operating floor from the ground below. Mr. George Barrett, the Works Manager at Hilsea, said one man was quite enough to deal with the skip. At about 8.15 on Sunday evening the skip was found turned upside on the operating floor, and deceased was lying across the top of it; his head being jammed between the skip and the wall. The lift must have been lowered by some means for the accident to have happened. The skip might have tumbled over the edge of the lift, and the deceased have fallen over the top of the skip. There was nothing the matter with the lift. Mr. J. D. Ashworth, the Engineer and Manager of the Company, expressed the opinion that the floor of the lift might have been lowered for ventilating purposes, and that the deceased forgot this. Dr. Jeans, who was called to the works, found that the deceased had expired on his arrival. As the result of a post-mortem examination, he attributed death to laceration of the brain due to the accident. The Coroner, in summing up, remarked on the fact that in the great number of years he had been Coroner there had been so few accidents at the gas-works. A verdict of "Accidental death" was returned. On behalf of the Directors, Mr. Ashworth expressed deep sympathy with the widow and friends of the deceased, and remarked that this was the first accident that had occurred since he had been Manager—about 17 years.

POISONED BY "T.N.T." FUMES.

First Death Reported from this Cause.

The Coroner for the Southwark district last Friday inquired into the death of Albert Victor Winter (aged 44), a worker at the Woolwich Arsenal, from poisoning by trinitrotoluene. The widow, in the course of her evidence, stated that her husband went to work at the Arsenal in April. About two months ago she noticed that he was turning yellow, and thought he was suffering from jaundice. He told her he was engaged in boiling down a high explosive called "T.N.T.," and said he would ask to be taken off the work. He gradually became worse, and died in Guy's Hospital. Arthur John Turpin, assistant foreman in the High-Explosives Factories at the Arsenal, said deceased was employed in filling shells. The "T.N.T." crystals were put in a tank, and he had to boil them down and draw off the liquid. The fumes might be dangerous; but there had not been a case of poisoning from them previously. Respirators and gloves were provided for the men; but they did not always use them. When deceased showed signs of contact he was seen by the Arsenal Doctor, who, however, returned him to work.

Medical evidence by Dr. C. Dean, of Guy's Hospital, was to the effect that death was due to acute atrophy of the liver, caused by poisoning from the fumes of "T.N.T." Dr. Collis (Inspector of Factories) told the Coroner that knowledge concerning the dangerous properties of "T.N.T." had only come to light quite recently. The nitrobenzines, of which it was one, had been recognized to be poisonous for a long period; and there were regulations governing their manufacture. The fact that there was danger from these fumes only came prominently before the Home Office in July last, and appeared to be in connection with exposure to the fumes during melting. Previously, when it was handled and used dry, certain symptoms of skin trouble developed; but there were no serious symptoms affecting the general health. This was the first death from this cause into which an inquiry had taken place. Suggestions had been made by the Home Office to guard against the danger; and these were being proceeded with. Owing to the pressure of work at the Arsenal, however, it was impossible to carry them all out in a few days.

A verdict in accordance with the medical evidence was returned; the Jury finding that death was due to misadventure.

GAS-FITTERS v. PLUMBERS.

Trade Jealousies.

For some time past the members of the Institute of Plumbers have taken strong exception to the introduction of separate classes for the teaching of gas-fitting; and recently the Executive Committee approached the City and Guilds of London Institute on the matter, because they feel that the classes are prejudicial to their interests. They strongly urge that gas-fitting ought to be exclusively confined to the plumbing classes.

The question was discussed by the Governors of the Plumbers' Institute at its meeting at Blackpool last week, when a report was submitted stating that a deputation had waited upon Mr. Morton Latham, the Chairman of the Technology Committee of the City and Guilds of London Institute, and laid their views before him. The deputation was well received; and it was promised that the position of the plumber would be fairly represented to the Committee controlling the various syllabuses issued by the City and Guilds Institute.

In the discussion which followed, the Secretary (Mr. J. W. Hirst) stated that the gas companies throughout the country were largely to blame for the creation of these classes for their employees. In many cases, they provided the teachers and gave prizes. So far, the classes were mostly confined to the South of England; but they were now spreading to the North of England, and he urged that strenuous opposition would be required if this development was to be combatted. Action had been taken at the Salford meeting of the Plumbers' Institute; and they were hopeful of good results. The members of the Plumbers' Institute feel, he said, that the gas companies are taking an unfair advantage of the plumbing trade, by encouraging their workmen to attend the classes—believing it will eventually lead to an undesirable encroachment on an important part of their business. One member stated that gas-fitting was a "big slice of the plumber's loaf."

RATE-AID FROM GAS PROFITS IN NEW ZEALAND.

A Protest from Wanganui.

In giving his report on the working of the Wanganui (N.Z.) gas undertaking for the past year, at the Borough Council meeting early in May, the Gas Manager (Mr. G. D. Stone) stated that, through various reasons, the profits were not as large as was at first anticipated; but considering the adverse circumstances with which they had had to contend during the year, he thought that the profits were fairly good.

After dealing with the various figures in the accounts submitted, Mr. Stone added that the whole of the new plant recently brought into operation was giving every satisfaction; and he then dealt with the question of the disposal of surplus profits and capitalization. These two questions, he remarked, having recently been brought into great prominence together with a certain amount of criticism of the management, was, he thought, sufficient to warrant him dealing with the matter at this juncture.

He said: I feel that I would be failing in my duty if I did not present the serious aspect of the question affecting the gas-works. This is a matter of far-reaching and of vital importance to the ultimate results of the works. I am aware that the using of the surplus profits for the relief of the rates is very fascinating from the councillors' point of view; but to continne on these lines must seriously affect the capital and profit.

The works, costing several thousand pounds, bought over from the Company after working a fair lifetime were considered to be too small or out of date; and practically the whole of the plant in the works was scrapped—thus largely handicapping the works from the commencement with over-capitalization. The output of gas more than tripled in ten years, and some portions of the plant again became too small. It was not scrapped, but must be sold at about half the original cost.

In a prosperous and growing town and district as we have here, the gas-works must be enlarged to meet the demand. Extensions cannot be carried on without means; and if the profits are otherwise used, borrowing must be resorted to. Borrowing means more interest to pay, and less surplus profits. After a lifetime of gas-works management, I have no hesitation in saying that the surplus profits should be used in extension of plant until such time as the handicap has been removed and the works well established. We live in an age of invention and competition; and it is possible that a new and cheaper illuminant may be invented at any time. You are anticipating introducing the electric light. This will cut into the most profitable part of our business, reducing our profits to a very considerable extent. It has been my endeavour to keep down the capital as low as possible; and my success in this line I am prepared to submit to any competent gas expert.

The question has been asked, Why have the profits not increased in proportion to the increase in business? The following statement will show the percentage of profits on capital invested each year for the last ten years: 1904, 16½ per cent.; 1905 (price reduced to 5s. 6d., June, 1904), 11⅛ per cent.; 1906 (price reduced to 5s, July, 1905), 7⅛ per cent.; 1907, 10½ per cent.; 1908, 11⅜ per cent.; 1909, 8½ per cent.; 1910, 9⅜ per cent.; 1911, 10 per cent.; 1912, 12½ per cent.; 1913, 14⅜ per cent.; 1914, 14 per cent.; 1915, 11½ per cent.

At the same time I would remind you that during the last eight years coal has advanced from 20 to 30 per cent.; ordinary labourers' wages, 12½ per cent.; stokers' wages, 22½ per cent.; gas-works plant and material, from 20 to 30 per cent. Notwithstanding these large disadvantages, we are selling gas at the same price. One may well inquire, Are there any other businesses doing this, that are paying?

I will take the year just closed (1914), and compare it with the year 1905—showing how the advance in prices cut into our profits. The advance on coal had increased our coal bill by £3127; our labour bill at the gas-works only £746; labour and material on maintenance £250—making a total of £4123. This is not all, but sufficient to show to a large extent how the advance in cost has reduced our profits. I have no hesitation in saying that it is only through the better results obtained from the coal that we are able to make the present profits. The following is the average make of gas per ton of coal carbonized, for the last ten years: 1905, average 10,307 cubic feet per ton; 1906, 11,287 feet; 1907, 10,771 feet; 1908, 11,333 feet; 1909, 11,597 feet; 1910, 12,731 feet; 1911, 13,631 feet; 1912, 13,422 feet; 1913, 14,522 feet; 1914, 14,804 feet. Two-thirds of the mileage of our gas-mains are extended to the suburbs, which were to pay 7s. and 7s. 6d. per 1000 cubic feet, which was barely a paying proposition at that price. But having come into the borough, they are supplied at the same rate—namely, 5s. per 1000 cubic feet, reducing the profits by about £1000 per annum. Public lighting has been extended, for which the Gas Department receives about half the actual cost. Tar is sold to the borough below market value; and gas and coke to the trams on the same lines—reducing our profits by another £1000 per annum. The Manager is not consulted; nor has he any control over these matters.

Our charge for gas will compare favourably with any other works in the Dominion—from 4s. 3d. to 5s. per 1000 cubic feet. There is only one gas-works selling below this price for lighting—viz., 4s. 9d.; they being in a position to buy their coal at about 4s. per ton less than we can. The difference in cost of coal more than compensates for the difference in the charge for gas. The quality of our gas compares favourably with any other town; and the yield per ton of coal also.

While on this subject, I would like to quote one of the most successful municipal gas-works in the world—Widnes. Gas is sold there for 1s. per 1000 cubic feet, and in some cases at 10d. From the time of the Municipality taking over the works, more than thirty years ago, the surplus profit has been used to reduce the capital, and has almost wiped out the whole capital. These works light the borough free.

Our coal-stores are only large enough to carry about six or seven weeks' stock for the winter months. Last year I suggested preparing a suitable place in the yard to stack (say) 1000 tons outside, as in the event of a strike or accident we would not be on our beam-ends at once. My suggestion was not acted on. I must again apply for permission to considerably increase our stock of coal during the winter months. The result of carrying small stocks we realized last winter, when having to buy any coal that was available at increased prices.

Our carbonizing plant being extended, we are now in a position to push our business in gas-cookers. I would suggest that from £300 to £500 be expended in gas-cookers to be fixed free of cost, provided a given quantity of gas is consumed per month. Details can be arranged if the suggestion meets with approval.

The report was referred to the Gas Committee for consideration.

PRODUCTION OF COAL-TAR COLOURS IN AMERICA.

[From the "Board of Trade Journal."]

According to recent issues of the United States "Commerce Reports," the effects of the dyestuffs famine in the United States are becoming more and more apparent each day. In some instances textile mills are forced to close-down for the time being, until new supplies of dyes can be obtained. This is especially the case in works consuming large amounts of indigo, the lack of which has become very acute. Manufacturers are now bringing out brown denims, instead of the familiar blue fabric; but merchants and consumers are reluctant to accept the substitute. Similar modifications are being made in a multitude of cases; the primary purpose as a rule being to reduce to a minimum the actual amount of dyestuffs used. The possibility of securing fairly satisfactory shades by the use of vegetable dyestuffs has been demonstrated; and the consumption of logwood, fustic, quercitron, cutch, hypernic, &c., has become very large.

In the meantime the few American manufacturers of coal-tar colours are steadily expanding their plants, and are producing dyestuffs in quantities hitherto unknown. Equally noteworthy is the steady increase in the manufacture of intermediates—aniline oil, betanaphthol, para-nitraniline, &c.—by the firms lately started in this field. Under the circumstances, widespread interest is attached to concerted action on the part of leading manufacturers at Bâle (Switzerland). The firms in question find themselves in a serious dilemma. They are now practically cut off from all supplies of coal-tar crude and intermediate compounds, and may soon be forced to close their vast establishments for an indefinite period. In face of this threatened danger, they are turning to the United States for assistance. Fully aware of the latent possibilities in the American coke industry to produce coal-tar crude products in enormous quantities, and also of the great consumption of foreign-made dyes in the United States, the Swiss colour firms now seek to secure an ample supply of American crude products, and to pay for them in finished dyes.

A NEW HIGH-GRADE FERTILIZER.

An engineering correspondent of the "Yorkshire Post," writing last Tuesday, said: It is believed that the next big development in artificial fertilizers will be the commercial manufacture of a high-grade synthetic salt containing nitrogen and phosphorus in large and well-balanced percentages. Chemists in several parts of the world are at work upon the production of such a fertilizer. The line of approach most in favour is the fixation of atmospheric nitrogen; the conversion of the nitrogen into ammonia; and the combination of the ammonia with phosphoric acid, to give ammonium phosphate. The fixation of atmospheric nitrogen can be done by several processes, chief among which is the cyanamide process. In this process nitrogen gas is first obtained by liquefying air, and then raising it to a temperature at which the nitrogen will boil off, leaving the oxygen behind. Calcium carbide is then placed in contact with the nitrogen, and absorbs the gas to the amount of about 20 per cent. of its own weight. The result is cyanamide. The cyanamide is now mixed with water, which, on being heated under high pressure, is converted into ammonia; and the ammonia is finally combined with phosphoric acid to give ammonium phosphate. It is reported that ammonium phosphate containing over 13 per cent. of ammonia and 50 per cent. of phosphoric acid is now being produced commercially, although up to the present only on a magnified laboratory scale; and the salt, which thus contains over 60 per cent. of plant food, the bulk of the remainder being chemically combined water, is said to possess in a high degree the many requisites of a good fertilizer—being non-hygroscopic, non-poisonous, finely granular, not subject to too rapid percolation, and being readily assimilable by the plant. When mixed with the high-grade potash salts available it will make, it is claimed, a complete fertilizer some six times as concentrated as the average grade sold to-day. For a time it was thought that a highly suitable compound of ammonia and phosphoric acid could be made by treating phosphate rock with nitric acid; but the product of this process proved to be too hygroscopic and too low in contained plant food. Two methods of manufacturing ammonium phosphate compounds from ammonia obtained by the cyanamide process and phosphoric acid are undergoing development. One of these is applicable wherever cheap sulphuric acid may be had. The second, which employs the electric furnace in driving off phosphorus from the phosphate rock, is applicable only where cheap water power is available. The importance of these developments can hardly be over-estimated, in view of the fact that one of the most pressing problems of the future will be that of supplying plant food to an impoverished soil.

Additional Capital for the Melbourne Gas Company.—On June 30 the shareholders of the Metropolitan Gas Company of Melbourne, at an extraordinary general meeting, gave the Directors authority to raise, as and when considered necessary, a sum not exceeding £50,000, by the creation of 10,000 additional shares of £5 each, and conditionally upon the issue of the shares to borrow upon debentures such sums as they think fit up to the amount mentioned. At the meeting the Chairman stated that the Board did not intend to issue the shares until July 23, which would be two days after the publication of the Company's half-yearly balance-sheet, as the information contained in it would help shareholders to assess the value of the new stock. The shares had to be offered by public auction, in conformity with the Company's Act.

HOT-WATER SUPPLY IN WORKMEN'S HOMES.

A Practical and Economical Method Wanted.

Discussing in the "Manchester Courier" the problem of hot-water supply in dwelling-houses, "Medical Officer of Health" says it has been solved, so far as the better-class houses are concerned, by the gas boiler and circulating systems, but asks, What about the working classes, and hot water for the working man's home? Considering this matter it is remarked:

The problem becomes a very difficult one, but not one that cannot be overcome. Very little cleaning and washing can be done without hot water—at least in a temperate climate. There is personal washing and clothes washing, and the scrubbing of floors and tables—all require soap and hot water. For the very poor, living in one room, the coal fire is used for nine out of the twelve months of the year; the heat from the fire warming the room and the people of the room, boiling a kettle and a saucepan. Attached to the fire grate may be a side boiler with a tap, from which hot water is obtainable for washing; but often no such boiler is attached, and cleanliness suffers, the housewife despairs, and matters go from bad to worse, with the usual results—a slummy room and the consequent visiting of the nearest public-house by both man and wife.

In tenement buildings the difficulty is overcome by a central supply of hot water, common to the whole of the tenements; and the fuel used for this central supply is either coke or gas. A similar arrangement might be made for rows of houses, with the establishment of common wash-houses, where not only could washing of clothes be done, but also a copious supply of hot water obtained on demand. The cost of such an installation could be spread over the whole of the houses using the same, and would only amount to a very few pence per family. The educational value of such an installation would be immense.

In Huddersfield there are gas-heated coppers in the small houses as well as gas-cookers, both fed by the "penny-in-the-slot" methods; so that the matter is receiving the attention of those interested, and experiments are being carried out. Unity is strength, and the final solution of the problem will probably be found in co-operation and amalgamation—the institution of central stations from which the various consumers and users will be supplied with hot water for purposes of cleaning and washing. It is manifestly unfair to expect a working man's home to be kept clean if no means are provided for the supply of hot water for cleansing, and, as education increases, cleanliness will become more and more essential, and be more and more insisted upon by all, so that the need for greater facilities for obtaining the means of guaranteeing such cleanliness will be forthcoming, and Housing of the Working Classes Committees and gas companies will have to devise some practical and economical method of meeting the demand.

In Manchester, it may be added, part of the problem has been solved by the Corporation by the provision of public wash-houses. Perhaps the Corporation soon will "lay on" the hot water!

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

An interesting report on the public lighting of Aberdeen has been issued by Mr. Alexander Forbes, the Lighting Inspector for the city. It traces the development—and incidentally speaks of the recent curtailment—of lighting in Aberdeen. Mr. Forbes expresses regret that, owing to the war crisis, public lighting had to be so much reduced that by the end of the season "lighting" was almost a negative term. The reduced lighting had had its compensating effects, in respect that there had been a pronounced saving in the department. For gas and electric current alone the charges were £5352 less than the previous twelve months' figures Adding to this mantles, globes, carbons, &c., the saving amounted to a very considerable sum. A comparison of the figures of the consumption of gas and electricity for 1913-14 and 1914-15 shows the saving due to restricted lighting. The total figures for gas in 1914-15 amounted to £911, compared with £4389 in 1913-14 —a decrease of £3478. The electricity total in 1914-15 was £524, and in 1913 14, £2398—a decrease of £187.

Many gas committees in Scotland are cutting down their estimates for the forthcoming year. At Coatbridge there is a reduction of £800 on the street lighting for the present year. At last Thursday's meeting of the Dundee Town Council, some discussion took place in connection with the gas estimates, which, it was stated, had been reduced from £9995 to £8230. The original estimate in respect of public lamps was £4194; and it was proposed to cut this amount down to £3000. A member took exception to the proposal, which, he remarked, did not seem to be accurate financing. The actual expenditure last year was £11,000; and they were now calculating on only £8230. The Treasurer said the estimate had been reduced after inquiry by the Lighting Committee. Only half of the public lamps would be lit this year, instead of two-thirds as last year; and the Committee agreed that this would meet the requirements of the military authorities. After some further talk, the estimates were approved.

Messrs. W & J. Knox, Limited, who supply gas to the town of Kilbirnie, have increased the price from 4s. 7d. to 5s. 5d. per 1000 cubic feet. At Airdrie the price of gas has been raised to 3s. 4d. per 1000 cubic feet—an increase of 5d.

The Barrhead Gas Company have just installed the Alder and Mackay automatic system of street lighting. The plant has been tested, and is completely successful—all the street lamps being lit within a few seconds. The four-wave method has been adopted—this permitting of a proportion of the lamps being extinguished about midnight, and relit early in the morning.

The Directors of the Liverpool Gas Company have declared an interim dividend of 2½ per cent. on the ordinary stock for the half year to June 30, payable (less income-tax at 2s. 1d.) on Friday last.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Aug.* 23.

The market is still steady and without any new features. Continental users are inquiring for pitch for next season; but the uncertainty as to the ultimate cost of freight makes it somewhat difficult to arrange business at present. In addition to the light products of tar, the position of creosote and naphthalene continues strong. There is no change in prices to record.

With regard to sulphate of ammonia, it is understood that export licences for this material are now being obtained in a shorter time than formerly, and it is anticipated that stocks awaiting shipment at some ports will soon disappear. The quotation remains at £14 8s. 9d. per ton net, for 25 per cent. quality, filled into buyers' bags at Makers' works.

Tar Products in the Provinces.

Aug. 23.

There is no alteration in the market for tar products. Very little business has been done in pitch, though there has been one or two inquiries from France during the past week. Solvent and heavy naphthas are in fair demand, and prices are well maintained. Creosote is quiet, and further sales are reported at reasonable figures.

The average values of gas-works products during the past week were: Gas-works coal tar, 21s. 6d. to 25s. 6d. Pitch, East Coast, 22s. per ton; Norfolk, Suffolk, and Humber ports, 19s. to 20s.; West Coast, 20s. to 21s. Manchester; 21s. to 21s. 6d. Liverpool; 23s. Clyde. Benzol, 90 per cent., North, 10½d. to 11d.; 50-90 per cent., naked, North 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 2d. to 2s. 4d. Crude naphtha, in bulk, North, 6d. to 6½d. Solvent naphtha, naked, North, 1s. 10d. to 1s. 11d. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3d. to 3 1/16d. Heavy oils, in bulk, 3⅜d. to 4d. Carbolic acid, casks included, 60 per cent., East and West Coasts, 3s. 6d. Naphthalene, £8 to £16; salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2d. to 2½d. per unit; "B" quality, nominally ¾d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *Aug.* 21.

During the past week there has continued to be a drooping tendency in the market for this material, and it has only been possible to effect sales by making a further concession in prices. Demand from abroad has remained small, and middlemen in this country apparently have ample supplies to meet their present requirements. The closing quotations are £14 10s. per ton f.o.b. Hull, £14 11s. 3d. f.o.b. Liverpool, and £14 12s. 6d. f.o.b. Leith. For October-March or January-June delivery, in equal monthly quantities, several makers are now willing to accept a little below £15 per ton at the ports, but not much interest has been shown in the forward position.

Nitrate of Soda.

This market has hardened still more, and the values are now 13s. per cwt. for ordinary, and 13s. 3d. for refined quality, on spot.

Sulphate of Ammonia.

From another source it is reported that this market has continued very quiet throughout the past week, and several lots have been offered at to-day's prices without finding buyers. Outside London, makes are quoted at £13 17s. 6d. to £14; Hull, £14 10s. to £14 12s. 6d.; Liverpool, £14 15s.; Leith, £14 17s. 6d.; Middlesbrough, £14 10s. to £14 12s. 6d.

COAL TRADE REPORT.

Northern Coal Trade.

The coal trade is quieter, and for some classes of fuel the prices are slightly lower. There is a scarcity of steamships, and there is also a sparing issue of licences for export, so that the market has felt the influence. In the steam coal trade—which is so largely an export trade—the market is dull for the time, though fuller arrivals of steamers would improve it. Best Northumbrian steams are from 20s. 6d. per ton f o b for this month's delivery; and second-class steams are quiet at 16s. 6d. per ton. Steam smalls are on the whole meeting a steady demand, and the current prices are from 13s. 3d. to 15s. per ton f.o b. There are at times higher prices forward asked. In the gas coal trade, the price has fallen, owing to the influences mentioned above, and best Durham gas coals are now quoted at about 20s. per ton f.o b. Second-class gas coals are 17s. to 17s. 6d. per ton; and "Wear Specials" are near 23s. per ton f.o.b. The production is fairly good, and deliveries are better on the long contracts, where there is the needed prompt tonnage and the licence for export. Freights have stiffened somewhat, and about 7s. 3d. is the rate for gas coal Tyne to London, and 15s. to Rouen. Little is doing in new contracts, and the uncertainty as to actual prices has interfered with forward sales; but it is the general impression that home needs will have more attention than a few months ago. On the other hand, enlisting is still lessening work at the collieries, so that the prospect for winter supplies of gas coal is not the brightest. Coke is steady. Gas coke is not yet in heavy supply, though slowly increasing. Good gas coke is quoted from 25s. 6d. to 27s. per ton f.o.b. in the Tyne.

Brighton and Hove General Gas Company.

The report of the Directors of this Company, issued in anticipation of the half-yearly meeting of the proprietors on Friday, at the London offices, Great Winchester Street, E.C., states that, in comparison with the results for the half year ended June 30, 1914, the sale of gas showed an increase last half year of 50,519,000 cubic feet, or 6·8 per cent., and the revenue from residuals an increase of £6340—the latter being due to the larger quantities of coke and breeze produced for sale, and to an improvement in the prices realized. The enhanced cost of freight, coal, and all other materials used in the manufacture and distribution of gas, the war bonuses paid to workmen, and the allowances made to dependants of employees engaged with the forces represented a serious addition to the charges which the Company have to meet. These additional burdens, the report continues, have not yet been fully felt; but the Directors have deemed it necessary to increase the price of gas throughout the Company's limits of supply by 3d. per 1000 cubic feet as from March 31 last. The profits for the half year were £30,644, to which was added £35,711 brought forward from the previous half year—giving a total of £66,355. After charging income-tax, interest on debenture stock, and the cost of the Company's new Special Act, &c., and writing off £2952 in respect of depreciation of securities representing the special purposes fund, a sum of £59,319 is available for dividends, which are recommended at the statutory rates. This appropriation will require £22,705, and leave a balance of £36,613 to be carried forward. The report is signed by Mr. Arthur M. Paddon, Chairman.

Birmingham and its Elective Auditors' Comments.—The Elective Auditors to the Corporation of Birmingham (Messrs. Houghton and C. E. Smith) have prepared a report on their audit of the city's accounts for the past financial year. They state that the abuses which a financial critic discovers in the local administration are "not illegalities or improprieties against admitted principles, but practices openly sanctioned and justified." High salaries, excessive professional fees, extravagant compensation, heavy interest charges, are said to "make the ransom of a small kingdom." As to the Gas Department, they point out that large contracts are made for mains and services, the basis of which appears to be cost price, *plus* a percentage for profit and supervision. The figures are not subject to competition; and the only check the Committee have is the watchful eye of the Distributing Engineer. "The department may have had good value in such contracts; but the Auditors share the opinion of a member of the Committee—that the system itself is unsound, and lends itself to extravagance." Dealing with the Water Department, they remark that comment has been made before on the large amount of overtime paid for by this department. Extra work on alterations of water charges cost £105. Refreshment allowances, as well as overtime, are paid. The Auditors do not think any other department of the Corporation pays on this liberal scale.

Rochester Gas Company.

On Thursday week the half-yearly general meeting of the Rochester, Chatham, and Gillingham Gas Company was held—Alderman E. W. Willis, J.P., in the chair. In the course of the report submitted by the Directors it was stated that the completion of the new gasholder, vertical retort settings, and coal and coke handling plant, which has so long been delayed, owing to the scarcity of labour and the difficulty in obtaining materials, is now an accomplished fact. Already the plant has proved of very great service; and the Directors feel that not only will economies be effected, but it will now be possible for the Company to face the ever-increasing demand which is being made in their Gillingham district. Specially mentioning this matter, when moving the adoption of the report, the Chairman (after analyzing the figures of the accounts submitted) said that when the new works were in full operation it was hoped the Company would be able to scrap some of the old ones—some of the retort-houses were obsolete—and this would give them an opportunity to work at a much cheaper rate. A dividend at the rate of 5 per cent. per annum on the consolidated ordinary stock, less income-tax, was declared; and the usual votes of thanks to the Chairman and Directors, to the Auditors, and to the officials followed. Mr. Lewis Levy, in proposing the vote, paid a great tribute to the energy of the Chairman. They were much indebted, he considered, to all concerned for the labour put in and skill with which they managed the affairs of the Company. Mr. Elliott, in seconding, spoke of the good qualities of the Secretary and their Engineer (Mr. Day and Mr. Bennett), and gave the meeting the reminder that Mr. Day had been in the service of the Company for nearly half a century. Both Mr. Day and Mr. Bennett suitably replied—the latter remarking that, because of the extraordinary times through which they were passing, they realized that extraordinary care and extraordinary thought were needed.

Curtailed Street Lighting made a Personal Grievance.—At last week's meeting of the Nuneaton Town Council, one of the members (Mr. J. H. Whitehouse) asked who had given the order for the curtailed lighting of the streets of the borough. He contended that the dark streets were a source of greater danger than any likely visit of airships and aeroplanes. The Mayor said he understood it was a matter entirely in the hands of the police. Mr. Whitehouse repeated his question, and added that unless the information was forthcoming, he should tender his resignation as a member of the Council. It was not right that one person should override the opinions of members who were sent there as the representatives of the people. The Mayor was surprised Mr. Whitehouse should make a little personal inconvenience the ground of such an outbreak at so critical a time. His (the Mayor's) opinion was that they ought not to have any lights at all. Coventry, a great munition centre, was not far distant from Nuneaton; and therefore it was highly probable Zeppelins might come. The incident then closed.

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See "Journal" for May 25 and June 1 & 8 (pp. 471, 525, & 596).

For further particulars apply to—

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Grays and Tilbury Gas Company.

The half-yearly meeting of this Company was held at the London offices, No. 4, Eastcheap, on Monday of last week, when dividends at the rate of 8¼ per cent. per annum on the "A" shares and of £5 19s. per cent. per annum on the "B" shares—both less income-tax—were declared. In the absence of the Chairman (Major F. E. Bartlett) on military duties, the Deputy-Chairman (Mr. Courtenay C. S. Fooks) proposed the adoption of the report and accounts. The revenue account showed a profit of £5282; and after providing for the fixed charges, there remained a balance to the credit of net revenue account of £6265, of which the dividends will absorb £3750—leaving £2534 to be carried forward. The Directors much regretted that, owing to the high cost of coal and other materials, they had been compelled to increase the price of gas. Mr. G. C. King and Mr. Worthington Church were re-elected Directors. A hearty vote of thanks to the Directors, Engineer, Secretary, and staff was passed and responded to by Mr. A. W. Sumner, the Engineer and Manager, and Mr. W. F. Whittaker, the Secretary.

Gas v. Electricity for Workhouse Lighting.—In a discussion at the Navan Board of Guardians regarding the condition of the electric plant, the Clerk read the following figures showing the cost of gas and electric light, respectively, for the past three years: Gas—March 1913, £152 2s. 11d.; 1914, £49 14s. 7d.; 1915, £74 17s. 5d. Electric light—1913, £94 15s. 5d.; 1914, £149 8s. 4d.; 1915, £72 1s. 1d. Mr. Clusker thought they should instal gas and abandon the electric light, as they had no chance of getting a loan to enable them to deal with the electric plant; and if they went on as at present, they would be incurring further expense. The proper thing, in his opinion, would be to get gas until the war conditions were removed. Mr. Clusker said they had saved on gas in the past, and could do so again.

Bury St. Edmund's Gas Company.—Last Friday week the 132nd half-yearly meeting of the Company was held, under the chairmanship of Mr. T. Ridley. The six months revenue was £7842; the expenditure, £6054. The balance of £1788 added to the profit and loss account balance brought forward, £5312, and allowing for interest on the reserve fund invested, placed an amount of £7172 at the disposal of the shareholders. The Directors recommended, and it was agreed to pay, the usual dividend of 10s. per share on the 1849 capital, 7s. 6d. per share on the 1859 capital, and 7s. per share on the 1879 capital—all free of income-tax. The Chairman spoke of the increase of about £1100 in the sales of gas, as compared with a corresponding half of 1914. There had, however, been extra expenses. But on the whole there was a net balance of about £300 profit as compared with last year. Mr. H. R. Barker congratulated the shareholders on having improved their financial position, and welcomed the new Engineer and Manager, Mr. H. R. Wimhurst. The Chairman replied to a vote of thanks; and Mr. Wimhurst took the opportunity of expressing his pleasure at being associated with the Company.

Scraping a Water-Main at Liskeard.—At last Tuesday's meeting of the Liskeard Town Council an estimate was accepted for the scraping of the 8-inch water-main from St. Cleer reservoirs to Addington, at 8½d. per yard. The Borough Surveyor (Mr. T. M'Meikan), in a lengthy statement on the condition of the water undertaking, reminded the Council that the main was laid by the old Water Company about sixty years ago; and incrustation in it had been going on ever since. Fifteen years ago the Council purchased the water-works, and had been engaged in improving the supply by stopping leaks and in other ways; so that the supply to the town was increased by 25 to 30 per cent. Meanwhile an increased demand for water also arose by reason of new houses, for manufacturing purposes, and in other directions; and not only increased quantity but more pressure was required. After investigating over the past ten years various methods of cleaning mains, he was satisfied that the method now recommended would increase the volume of water by something exceeding 20,000 gallons per hour; so that, with reasonable care by consumers, and attention to leakages, the present demands might be met and existing complaints rectified. The cost of the work would be placed to the capital account, and would be a mere item if it tided over a further outlay on the mains for (say) twenty years.

Weymouth Consumers' Gas Company.—The Directors, in their report to be presented at the half-yearly meeting of the proprietors on Thursday, say that the demand for gas has never before been so high during the first half of a year as during January to June this year. The quantity sold was 76,031,100 cubic feet, or an increase of 9·74 per cent. upon the 69,277,700 cubic feet sold in the corresponding half of the year 1914. Coal cost nearly 50 per cent. more than it did twelve months ago. Some of the additional amount was caused by the larger tonnage of coal required to produce the increased quantity of gas sold; but the bulk of the addition was due to coal having to be bought outside the contract, owing to the difficulty of getting the contract coal conveyed, and to the abnormal rise in freight charges. About one-third of the additional cost of coal was "fortunately met by the better returns from residual products." When recently the question of entering into contracts for coal for the current year was before the Board, it was found that coal could only be bought at such high prices as would render it necessary, in the interest of the stockholders, for the price of gas to be raised. The Directors, therefore, gave notice that from June 30 the price would be increased from 3s. to 3s. 6d. per 1000 cubic feet to consumers using ordinary meters, and that the slot meters would be adjusted to make the increase in price to consumers using that type as nearly as possible the same. The Directors have depreciated the amount at which the Company's investments stand in the books by £1013. The balance at the credit of the net revenue account, after providing for interest upon the debenture stock and depreciation of investments, is £6007, out of which a dividend on the ordinary stock for the half year at the maximum rate of 5 per cent. per annum is recommended.

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Haverhill Gas Price Increased.—The Haverhill Urban District Council yesterday (Monday) week adopted the report of the Gas Committee, recommending that the price of gas, as and from the 30th prox., be increased from 2s. 10d. to 3s. 4d. per 1000 cubic feet.

Oundle Public Lighting.—At last week's meeting of the Oundle Urban District Council, the Gas Company's revised tender for lighting the public lamps, subject to not lighting three nights before and three nights after a full moon, as from the 15th inst. to May 1, 1916, was presented at £1 18s. per lamp. The question arose as to having all the lamps lit; it being stated that in many towns the lighting was being curtailed. Eventually the matter was left to the Highway Committee for consideration; but it was agreed that in the interim the all-night lamps be lighted until the matter is settled.

Romford Gas and Coke Company, Limited.—The half-yearly meeting was held on Saturday, when the Directors reported that the revenue profit for the six months was £3840. To this was added a small amount for interest on mains laid on undeveloped estates—making with the balance brought forward from the previous half year an available total of £7818. After providing for interest on debenture bonds, consumers' deposits, reserve fund, and insurance fund, there was a net balance of £7198. Out of this sum, the Directors recommended the payment of dividends at the rate of 13½ per cent. per annum on the original shares, and 10½ per cent. per annum on the "B" shares—both less income-tax. These amounted to £3094, leaving £4104 to be carried forward. The sale of gas, it was reported, showed an increase of 2·5 per cent. over the corresponding half year of 1914, "in spite of the restrictions on public lighting and large lamps outside business premises, imposed by the authorities in consequence of the war."

Bournemouth Gas and Water Company.—The ordinary general meeting (the 90th) of this Company will be held in London next Friday, when the Directors will report that the issues of capital referred to six months ago have been successfully completed; and the Board are now making an issue of £12,500 of 4 per cent. debenture stock, the proceeds of which will they anticipate suffice to complete the payment for the principal new works now in hand. The proprietors will be asked to sanction an issue of additional share capital to the amount of £25,000, and of further borrowing powers to the amount of £15,716. The results on the working during the past half year are considered to have been satisfactory. To meet the increased cost due to the rise in freights, coal, wages, and materials, the Directors felt compelled to raise the price of gas by 4d. per 1000 cubic feet from Ladyday last. The income from gas sales was increased thereby; and the sales of residuals were more profitable. Actual sale of gas, moreover, showed an increase of 9¾ per cent. After writing off £3500 for works superseded, the Directors recommend the payment of dividends (all less income-tax) varying from 6 to 15 per cent. per annum—which latter is the dividend on the original capital, determined by the price of gas. The dividends will amount to £20,150, and leave to be carried forward £23,876.

Leeds and its Water Supply.—The annual report of the Leeds Corporation water undertaking, just issued, shows that the amount expended on the works up to date has been £4,056,404. The net profit for the past year was £51,493; and after providing £49,804 for repayment of debt, there was a surplus profit of £1689 paid into the city fund towards the relief of the rates. The consumption of water last year was 5,728,699,000 gallons, an average of 15,695,000 gallons daily, which is a decrease of 153,000 gallons per day. The supply in bulk to other authorities was 156,144,000 gallons—an average of 427,792 gallons per day, as against 407,347 gallons the previous year. The daily average supply per head of the population was 32·19 gallons, as against 32·47 gallons the previous year.

Presentations to Officials.—At a recent meeting of the Dublin Corporation, a resolution moved by Alderman Quaid sought to express disapproval of the presentation of an address and gifts by the waterworks staff and other officials to Mr. M. A. Moynihan (the Engineer to the Water Committee and Deputy Borough Surveyor), on the ground that such presentations are open to the suggestion that employees feel constrained to subscribe. Further, the Corporation were asked to state their opinion that this particular presentation was "not consistent with the effective control of the Water Department." Mr. Sherlock submitted an amendment expressing confidence in Mr. Moynihan's capacity and probity, but deprecating the presentation of addresses to officials by their own men; and Mr. Quaid offered to withdraw his motion in favour of the amendment. The Lord Mayor (Mr. J. M. Gallagher) said Mr. Quaid's motion was "a most contemptible one." Mr. Daly moved "the previous question;" and this was agreed to by 46 votes to 9.

Worthing Gas Company.—The profit and loss account of this Company showed at June 30 last a balance of £23,809, of which £4384 was transferred from the revenue account as the difference between the receipts, £23,531, and the expenditure, £19,147, for the first six months of this year. The Directors report that the new gasholder will be in use next month. Various causes are said to have delayed the completion of this much-needed work; and now that it is accomplished it will conduce to the more efficient manufacture of gas and will enable the Board to arrange for a supply to the neighbouring parishes of Sompting and Goring. The necessary distributing mains are already laid to Sompting, and the work will shortly be undertaken in the case of Goring. Twenty employees of the Company have joined His Majesty's Forces, and four have enrolled themselves for the manufacture of munitions. The Directors mention that they could ill-spare their services; but with the cheerful co-operation of the present staff, work has been continued without serious inconvenience. In common with other gas companies, the Company have been compelled to meet the increased cost of coal and other materials by raising the price of gas, with the consequential result that the dividend must now be reduced to the standard rate of 5 per cent. per annum (less income-tax) upon the consolidated ordinary stock.

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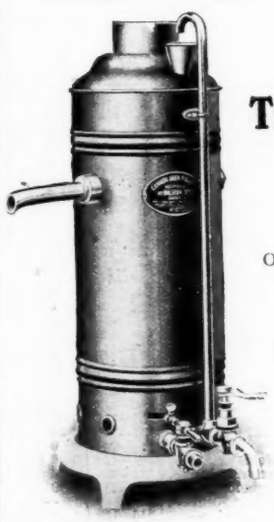

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Adjusting the Slot-Meter Prices at Normanton.—The half-yearly accounts of the Normanton Gas Company, submitted last week, showed that the undertaking, like most others, has been seriously affected by the war. To meet the extra cost of coal means an advance of 7d. per 1000 cubic feet to consumers; but this would necessitate expensive alteration of the slot meters. To avoid this, the increase decided upon was placed at 3d., and any deficiency will be made up out of the reserve of the Company. Last year the sales of gas had been 632,000 cubic feet less than in the previous one; the total income from all sources had decreased by £203; and the profits were £902 less.

Wellingborough Gas Company, Limited.—At yesterday's (Monday's) half-yearly meeting of this Company the Directors reported that the sale of gas during the six months to June was 9 per cent. more than for the first half of 1914. Contracts have been entered into for the supply of coal to the end of September of next year. The prices are "very seriously advanced;" but the Directors hope "by strict economy to avoid any increase in the price of gas." A new show-room was opened last January, and the results are said to have fully justified the step taken. The Directors recommended dividends of £6 12s. 6d. per cent. on the original shares and £5 2s. 6d. per cent. on the additional shares, less income-tax.

Chichester Gas Company.—The figures shown in the accounts of this Company, to be submitted at the half-yearly meeting of shareholders being held to-day (Tuesday), show that the business has been "adversely affected by the restriction of lighting imposed by the military authorities. The balance of the profit and loss account (after providing for interest on the debenture stock, temporary loans, &c.), amounts to £1846, out of which the Directors are recommending the declaration of a dividend for the half year to June 30, at the rate of 7 per cent. per annum upon the "A" capital, and £4 18s. per cent. per annum upon the "B" and "C" capital—all less income-tax. The Engineer (Mr. T. N. Ritson, Assoc.M.Inst.C.E.) reports that the works and mains are in a "thoroughly efficient condition."

Southport Gas and Electricity Joint Meter Readings.—This matter was again referred to at the last meeting of the Southport Town Council, on an item dealing with sundry wages in the minutes of the Gas Committee. Mr. Billington said some little time ago the Electricity Committee passed a resolution suggesting that the meters of the gas and electricity concerns should be read by one and the same person; and this was unanimously agreed to by a Sub-Committee of both Committees. He would now like to know whether the system of having two men had been stopped. The Mayor ruled that a question of policy could not be discussed at this stage; the item before the Council merely referring to the passing of accounts. Mr. Billington replied that he only wished to know whether the men had been stopped. He understood they had not.

Southgate District Gas Company.—Next Thursday the half-yearly meeting of this Company will be held at the London offices, Great Winchester Street, E.C., when dividends will be proposed of 5, 10, and 7 per cent. on the preference, original, and additional capital respectively. The sales of gas in the six months, January to June last, as compared with the corresponding half of 1914 showed an increase of 1,694,300 cubic feet, or 1·5 per cent.; and the revenue from residual products an increase of £295. After providing for interest charges, &c., there remains a balance of profit of £5324. The appropriation for dividends at the rates named will require £4219, and leave a balance of £1105 to be carried forward. The Directors report that the great increase that has taken place in the price of coal and other materials, and the payment of war bonuses to employees and maintenance allowances to dependants of the Company's workmen serving with the Forces has imposed a very serious burden indeed upon the Company's finances—the net deficit in the profits of the half year being no less than £1977. The price of gas was increased as from Midsummer from 3s. 2d. to 3s. 8d. per 1000 cubic feet. During last half year £2500 of "additional" ordinary stock and £5000 of 5 per cent. preference stock were issued; the proceeds, £8125, being credited to capital.

GAS COMPANIES IN THE STOCK EXCHANGE.

Business on the Stock Exchange was quieter than ever last week, and again the House was closed on Saturday without any danger of impairing the activities of the markets. It must, however, in regard to this fact be borne in mind that it is not solely attributable to the abnormal conditions resulting from the war, but there is the normal quietude of the mid-August slack season that has to be taken into consideration. Movements were irregular, and the tone was variable. In the earlier part of the week there was some animation and an approach to activity, with a cheerful tendency. The War Loan was rather easier; but more or less recovery was apparent in Home Rails, American and Canadian lines, industrial undertakings of the Dominion, and South Africans. Some Russian concerns attracted favourable notice. But, with the turn of mid-week, some reaction set in, and the best prices were not maintained. At the close, Americans were affected by the loss of the White Star liner "Arabic." A serious bearing-down factor was the American exchange, the steady and continuous fall of which occasioned much anxiety. A recovery in some measure was effected on Wednesday, by the light of a promise that the matter would be taken in hand by the Government; and the co-operation of the banks was manifested on Thursday by a resolution of the Clearing Bankers' Committee to send representatives to New York to consider and deal with the positions. Business in the Gas Market continued on the same light scale as the week before, the prices of which were well maintained. Further meetings of prominent undertakings have been held during the week, and the directors had the satisfaction of receiving the assurance of the proprietors' sympathetic support in the anxieties they had gone, and are going, through. The Money Market was still easy for short loans, and discount rates, after some firmness, relaxed a little.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 78⅜, 79, 79¼, 79½, ditto maximum 60, ditto preference 70¾, South African 9, 9⅛, South Metropolitan 80, South Suburban debenture 96½, 97. On Tuesday, Alliance and Dublin 59⅜, Gas Light ordinary 78⅛, 79, ditto maximum 59, Imperial Continental 55½, South Suburban debenture 96¾, 97. On Wednesday, Bournemouth debenture 74½, Gas Light ordinary 78¾, 79⅜, ditto maximum 59½. On Thursday, Commercial 4 per cent. 85, Gas Light ordinary 79½, ditto maximum 60, ditto preference 72½, South Metropolitan 80, 81, South Suburban debenture 97. On Friday, Gas Light ordinary 78¼, 79, ditto maximum 59¼, 59¾, Oriental 100, South Metropolitan 82.

The Bank rate is 5 per cent.—as fixed on Aug. 8, 1914.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING AUG. 21.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.			£ s. d.	
1,551,868	Stk.	April 8	9½	Alliance & Dublin Ord.	59—64	3 18 2	59⅜
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76—79	5 1 3	..
280,000	5	April 29	7½	Bombay, Ltd.	5½—6⅜	5 17 8	..
50,030	10	Feb. 26	16	Bournemouth Gas and Water { 10 p.c.	29—30	5 6 8	..
873,480	10	,,	7	Bournemouth Gas and Water { B 7 p.c.	15—15½	4 10 4	..
95,000	10	,,	6	Bournemouth Gas and Water { Pref. 6 p.c.	13½—14	4 5 9	..
—	—	—	—	Bournemouth Gas and Water { Deb.	..	—	74½
380,000	Stk.	Feb. 26	14	Brentford Consolidated	261—266	5 5 3	..
330,000	,,	,,	11	Do. New	204—209	5 5 3	..
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91—93	4 6 0	..
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208—213	5 3 4	..
244,200	,,	,,	8	Do. A Ord. Stk.	154—159	5 0 8	..
630,000	30	Mar. 26	19½	British	44—45	5 11 1	..
190,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	..
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0	..
100,000	10	—	—	Cape Town & Dis., Ltd.	1½—2½	—	..
100,000	10	—	—	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
167,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	108—110	4 10 11	..
1,513,380	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	5 1 2	85*
560,000	,,	,,	5½	Do. 3½ p.c. do.	103—105	5 1 6	..
475,000	,,	June 11	8	Do. 3 p.c. Deb. Stk.	69½—71½	4 8 11	..
800 000	Stk.	,,	4	Continental Union, Ltd.	76—79	5 1 3	..
200 000	,,	,,	7	Do. 7 p.c. Pref.	115—118	5 18 8	..
—	—	—	—	Croydon B and C 7 p.c.	..	—	..
492,270	Stk.	—	6	Derby Con. Stk.	123—125	4 16 0	119½*
55,000	,,	—	4	Do. Deb. Stk.	102—104	3 16 11	..
1,002,180	10	July 29	10	European, Ltd.	17½—18	5 11 1	..
16,364,910	Stk.	Feb. 12	1/17/4	Gas Light and Coke { 4 p.c. Ord.	98—102	4 15 6	78½—79½*
2,600,000	,,	,,	8½	Gas Light and Coke { 3½ p.c. max.	76—79	4 8 7	59—60*
4,062,235	,,	,,	4	Gas Light and Coke { 4 p.c. Con. Pref.	96—99	4 0 10	70½—72½*
4,674,850	,,	June 11	8	Gas Light and Coke { 3 p.c. Con. Deb.	72½—74½	4 0 6	..
180,000	,,	,,	10	Gas Light and Coke { 10 p.c. Bonds	..	—	..
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	10	April 29	11	Hongkong & China, Ltd.	16½—16⅝	6 11 4	..
—	—	—	—	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7½†	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6⅔†	Do. B	115—118	5 8 0	..
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	Imperial Continental	150—160	5 12 6	55½
1,235,000	Stk.	Feb. 12	8½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	..
200,342	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119—121	5 7 5	..
561,000	Stk.	Feb. 26	10	Liverpool 5 p.c. Ord. { A	211—213	4 13 11	..
718,100	,,	,,	7	Liverpool 5 p.c. Ord. { B	146—14	4 14 7	..
306,083	,,	June 26	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	—

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.			£ s. d.	
75,000	5	June 11	6	Malta & Mediterranean	4⅛—4⅜	6 9 9	..
250,000	100	April 1	4½	Met. of Melbourne { 4½ p.c. Deb.	99—101	4 9 1	..
541,920	20	May 28	4	Monte Video, Ltd.	11½—12	6 13 4	..
1,775,892	Stk.	July 29	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6	
529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14—15	5 2 8	..
800,000	Stk.	May 14	8	Oriental, Ltd.	117—122	6 11 2	100
60,000	5	Mar. 26	10	Ottoman, Ltd.	7⅛—7⅜	6 9 0	..
60,000	50	Feb. 26	13	Portsea, Island B	128—131	4 19 8	..
100,000	50	,,	12	Do. C	118—121	4 19 2	..
52,000	50	,,	10	Do. D	..	—	..
249,980	5	April 29	8	Primitiva Ord.	5½—6	6 13 4	..
499,960	5	June 26	5	,, 5 p.c. Pref.	4⅜—5	5 0 0	..
521,600	100	June 2	4	,, 4 p.c. Deb.	91—93	4 6 0	..
—	—	—	—	,, ,, ,, 1911	..	—	..
346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85—87	4 12 0	..
150,000	10	May 14	6	San Paulo { 6 p.c. Pref.	10½—11	5 9 1	..
125,000	50	July 1	5	San Paulo { 5 p.c. Deb.	47—49	5 2 0	..
135,000	Stk.	Mar. 12	10	Sheffield A	223—224	4 9 3	..
209,984	,,	,,	10	Do. B	222—224	4 9 3	..
523,500	,,	,,	10	Do. C	220—222	4 10 1	..
90,000	,,	May 28	9	South African	10½—11½	7 16 6	9—9⅛
6,429,895	Stk.	Feb. 12	5/4/0	South Met., 4 p.c. Ord.	111—113	4 16 8	80—82*
1,895,445	,,	July 10	8	Do. 3 p.c. Deb.	72½—74½	4 0 6	..
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	5 6 11	..
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	5 3 5	..
60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	4 9 3	..
—	—	—	—	Do. West Kent.	..	—	..
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	96½—97
629,740	Stk.	May 14	5	Southampton Ord.	99—102	4 18 0	..
120,000	Stk.	Feb. 12	7½†	Tottenham District { A 5 p.c.	135—138	5 8 8	..
742,275	,,	,,	6†	Tottenham District { B 3½ p.c.	115—117	5 2 7	..
181,255	,,	June 26	4	Tottenham District { 4 p.c. Deb.	87—89	4 9 11	..
182,380	10	Dec. 30	5	Tuscan, Ltd.	5—6	8 6 8	..
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93—95	5 5 3	..
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—109½	4 11 4	..
30,000	Stk.	Feb. 26	8⅜	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	5 7 4	..
255,636	,,	,,	6⅞	,, B 3½ p.c.	129—134	5 2 7	..
108,075	,,	,,	5/17/8	,, C 3½ p.c.	110—115	5 2 0	..
352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6⅔	Epsom 5 p.c.	121—126	5 5 2	..
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

* Ex Div.

Wrexham Water Company.—The report presented at the annual meeting of the Company stated that the expenditure on capital account during the year ended June 30, which amounted to £6261, had been chiefly incurred in connection with the provision of pipes for an additional trunk main. In the twelve months water had been laid on to 171 houses, making a total of 7776 houses now supplied. Out of the balance available, the Directors recommended the payment for the half year of the preference dividend free of income-tax, and also dividends at the rate of 7 per cent. per annum upon the consolidated stock, and £4 18s. per cent. per annum upon the ordinary stock, less income-tax. The report was adopted, on the proposition of the Chairman (Mr. H. Croom-Johnson); and subsequently an extraordinary meeting was held, when the Directors were empowered to raise further capital, to provide for the debit balance on capital account.

Income-Tax Free Dividends at Hailsham.—Against the advice of the Directors, the shareholders in the Hailsham Water Company determined that the dividends should be paid tax free. In proposing the adoption of the report, the Chairman (Mr. A. Burtenshaw) said that heretofore the Directors had recommended a dividend free of income-tax; but if they were to keep the rate to the previous level of 5 per cent. they would be obliged in future to deduct the income-tax. No one could have seen that the income-tax was going to jump in the way it had; and it was only right that it should be brought to the notice of the shareholders that it would be impossible to pay the dividend free of income-tax. If this was done the dividend would probably be 4½ instead of 5 per cent. After the report had been adopted, a shareholder proposed the dividend named in the report—5 per cent.—free of income-tax; and this was duly seconded and carried.

Malton Gas Company.—The half-yearly meeting of the Company was held on Friday week, Mr. H. W. Pearson presiding. The Chairman said the position of the Company was shortly that, by economy, they were able to pay their usual dividend, after taking only the sum of £105 from their floating balance. They had already increased the price of gas 3d. per 1000 cubic feet; and the consumers must expect at least another advance of the same amount, which would bring the price to 3s. The real reason was the enormous increase they had to pay on their coal contract, which was practically 30 per cent. higher than last year. It was the only time in his life that he had ever inclined to the idea that the nationalization of mines would be for the benefit of the country. He congratulated the Secretary and Manager (Mr. Henry Tobey) on his recovery from a serious illness. Mr. Tobey intimated he had just completed forty years with the Company.

West Surrey Water Company.—At the half-yearly meeting of the Company on the 10th inst. (Mr. A. T. Simpson presiding), maximum dividends at the rate of 7 per cent. per annum were declared upon the ordinary £10 shares issued under the Acts of 1877, 1888, and 1901; and a maximum dividend at the rate of 10 per cent. per annum was declared upon the ordinary £10 shares of the Company issued under the Act of 1869, leaving a balance of £2845 to be carried forward. The report for the six months to June 30 stated that the income, after making provision for empty houses, irrecoverable rates, &c., amounted to £9477, and the expenditure to £4027. Comparing the accounts with the corresponding half of 1914, the income showed an increase of £462; and the expenditure was greater by £438—principally on account of the high cost of fuel, extra rates and taxes, &c. The additional supplies connected during the half year represent an increased future rental of £161 per annum.

Sanction Refused to a Water Scheme at Carlisle.—At last week's meeting of the Carlisle Rural District Council, a letter was read from the Local Government Board declining sanction for the Council to borrow £64,250 for their projected water scheme. The Board said the scheme was not a pressing necessity, either for reasons of public health or on account of war requirements. The Carlisle City Council had, it was added, expressed their willingness to supply the rural district with water in bulk at a price to be fixed by the Local Government Board, or by an arbitrator appointed by them. The Water Scheme Committee of the Rural Council recommended that a Sub-Committee be appointed to approach the Carlisle Corporation, to ascertain to what extent, and on what terms, they were prepared to extend their supply into the rural district, and the lowest price at which they would sell water for a supply to the districts to which they were not prepared to extend their mains. The recommendation was adopted.

A Military Threat at Bridlington.—At a meeting of the Bridlington Town Council last week, the Mayor said he had received a letter from the military authorities to the effect that the lighting of Bridlington was still too bright, and threatening to cut off the gas and electric light at the mains before dusk if forthwith there was not an improvement effected. Further measures, therefore, are now being taken to reduce public and private lighting.

War Work and Gas Output.—In the course of an article on the "Effect of the War on the Output of Gas for Manufacturing Purposes," the statement is made by "C. M. W.," in the "Birmingham Gas Department Magazine," that in the city during the past nine months upwards of £15,000 worth of gas-furnace plant and heating apparatus has been installed in the premises of various manufacturers who are practically all employed directly on Government work—this representing an increased gas consumption amounting to upwards of 300 million cubic feet per annum. In connection with the melting of brass, gun-metal, and aluminium for Admiralty and War Office work, high-pressure gas is being extensively used, both for the production of the many thousands of castings daily required and for the production of strip metal for rolling into sheet.

The Hindley (Lancs.) Gas Committee have decided to increase the price of gas from 2s. 11d. to 3s. 4d. per 1000 cubic feet. The decision has been approved by the District Council.

The Provincial Incandescent Fittings Company ("Pifco"), of Manchester, send a copy of their new catalogue, for the present lighting season of 1915-16, containing full illustrated particulars of their specialities in the way of incandescent gas mantles, lamps, burners, globes, and chimneys.

Mr. Reuben B. Gledhill, of Adwalton (Yorks), has been appointed clerk of works and carbonizing foreman at the Basford (Nottingham) Gas-Works. Mr. Gledhill has for the past four years been draughtsman and retort foreman at the Pontypridd Gas-Works, South Wales.

"Richmond's Silent Gas-Fires" are illustrated and explained in a booklet, for the season 1915-16, which has just been issued by the Richmond Gas Stove and Meter Company, Limited. Special attention is directed to the "Period" series, the varied patterns of which, as the excellent photographic reproductions show, enable fires to be selected suitable for any scheme of decoration.

The campaign promoted by the Munitions Parliamentary Committee has been very successful in the Birmingham district, where Mr. George R. Thorne, M.P. for East Wolverhampton, and Mr. A. Shirley Benn, M.P., have addressed several meetings of employees engaged on munitions work. Among the places visited were the works of the Sutherland Meter Company, at Witton, when a meeting was held under the chairmanship of Mr. A. Cecil Wright. Subsequently, upon the proposition of Mr. Wright, seconded by Mr. A. C. Frost (the General Manager), a vote of thanks was accorded the speakers.

APPLICATIONS FOR LETTERS PATENT.

11,478.—WARDLE, W. W., "Mantles for incandescent gas-burners." Aug. 9.
11,481.—MACNICOL, A. N., "Obtaining oils, spirits, and gases from organic or other materials." Aug. 9.
11,485-6.—THORSSELL, C. T., "Production of ammonia." Aug. 9.
11,502.—SOC. DU GAZ DE PARIS, "Gas heating." Aug. 9.
11,543.—CHORLTON, A. E. L., "Internal combustion engines." Aug. 10.
11,636.—PHILLIPS, S., "Production of gas from coal." Aug. 12.
11,678.—BROUGHAM, A. R., "Internal combustion engines." Aug. 12.
11,761.—PARKINSON STOVE COMPANY, LIMITED, and CHESHIRE, W., "Securing gas-fire radiants." Aug. 14.
11,779.—MORISON, D. B., "Apparatus for use in combination with water-meters." Aug. 14.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

CHEMIST (COKE OVENS). Walkmill Colliery, Moresby.
FOREMAN (PURIFICATION). Croydon Gas Company.
WORKING FOREMAN. Midhurst Gas Company.
MAIN AND SERVICE LAYER. Todmorden Gas-Works.
EXHAUSTER ATTENDANT. No. 6080.
LID AND PIPE ATTENDANT. No. 6080.
STOKERS. Gravesend and Milton Gas Company.

Appointment Wanted.

GAS ENGINEER, &c. No. 6079.

Meeting.

HARROW AND STANMORE GAS COMPANY. Holborn Restaurant. Sept. 6. One o'clock.

TENDERS FOR

Coal.
LIVERPOOL GAS COMPANY. Tenders by Sept. 1.

Tar and Liquor.
ASHBORNE GAS DEPARTMENT. Tenders by Sept. 4.
BARNOLDSWICK URBAN DISTRICT COUNCIL. Tenders by Aug. 31.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

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"VOLCANIC" FIRE CEMENT.
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THE Gas Committee of the above Council invite TENDERS for the Surplus TAR and AMMONIACAL LIQUOR produced at their Works during the Year ending June 30, 1916, Delivered f.o.r. Ashborne into Buyers' Tanks.
Quantity of Tar, about 100 Tons; Liquor, 300 Tons.
The Committee do not bind themselves to accept the highest or any Tender.
Tenders, endorsed "Tar," and addressed to the Chairman, to be Delivered to the undersigned on or before Sept. 4 next.

By order,
H. G. HARRISON,
Manager and Secretary.